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No. 2291

United States

Circuit Court of Appeals

For the Ninth Circuit.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,,

Appellee,

And

ARIZONA COPPER COMPANY, a Corporation,

Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,,

Appellee.

Transcript of Record.

Upon Appeal from the United States District Court for the District of Arizona.

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[1*] *In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.*

No. 20A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

Bill of Complaint [of Mine and Smelter Supply Co. Against Detroit Copper Mining Co.].

THE MINE AND SMELTER SUPPLY COMPANY, a corporation duly organized and existing under and by virtue of the general incorporation laws of, and doing business in the State of Colorado, and having its principal office and place of business in the City and County of Denver in said State, brings this BILL OF COMPLAINT against the DETROIT COPPER MINING COMPANY OF ARIZONA, a corporation organized and existing under and by virtue of the general incorporation laws of, and doing business in the Territory of Arizona at Morenci, in the County of Graham in said Territory; and thereupon your orator complains and shows unto your Honor:

*Page-number appearing at top of page of original certified Record.

I.

That heretofore, to wit, prior to March 16th, A. D. 1897, Arthur R. Wilfley, who then was, ever since has been, and now is [2] a citizen of the United States and of the State of Colorado residing in and an inhabitant of the City and County of Denver in said State, was the original, first and sole inventor of a certain new and useful improvement in ore concentrators; that the same was a new and useful invention, and was not known to or used by others in the United States, and was not patented or described in any printed publication in the United States, or any foreign country, before the said Arthur R. Wilfley's invention or discovery thereof, and the same was not in public use or on sale for more than two years prior to the application of the said Arthur R. Wilfley for United States letters patent therefor, and that the same has never been abandoned; a more particular description of which invention will be found in the United States letters patent hereinafter referred to.

II.

That the said Arthur R. Wilfley, so being the original, first and sole inventor of said improvements, heretofore, to wit, on the 16th day of March, A. D. 1897, made application in writing, in due form of law, to the United States Commissioner of Patents, in accordance with the provisions of the then existing laws of the United States in such case made and provided, for letters patent of the United States for his said invention, and in respect thereto complied with all the conditions and requirements of said laws,

and of the rules of practice of the United States Patent Office in such case made [3] and provided.

III.

That all the requirements of the laws and of the rules of practice of the United States Patent Office in such case made and provided, having been fully complied with by the said Arthur R. Wilfley as aforesaid, and upon due proceedings had in said Patent Office of the United States in full accordance therewith, relating to the granting and issuance of United States letters patent for inventions, and after due examination made by the United States Commissioner of Patents, as to the novelty and patentability of the said invention as required by law, and the aforesaid invention and improvements in ore concentrators having been found by the Commissioner of Patents to be novel and patentable under and in accordance with the said laws and the rules of practice of the said United States Patent Office, thereafter, to wit, on September 28th, A. D. 1897, letters patent of the United States, bearing the date last aforesaid, Numbered 590,675, signed, sealed and executed in due form of law, were granted, issued and delivered by the United States Commissioner of Patents to the said Arthur R. Wilfley, his heirs, legal representatives and assigns, under the seal of the Patent Office of the United States, signed by the Assistant Secretary of the Interior, and countersigned by the said Commissioner of Patents, whereby there was granted and secured to the said Arthur R. Wilfley, his heirs and [4] assigns, for the full term of seventeen (17) years from and after said

last named date, to wit, September 28th, A. D. 1897, the sole and exclusive right, liberty and privilege to make, use and vend the said invention throughout the United States of America and the Territories thereof, as by said original letters patent No. 590,675, or a duly certified copy thereof, here in court to be produced as may be required, will more fully and at large appear.

IV.

That thereafter, on to wit, the 12th day of October, A. D. 1905, by his assignment in writing, duly executed and acknowledged, and bearing the date last aforesaid, the said Arthur R. Wilfley, for a good and valuable consideration, did sell, assign, transfer and convey unto your orator, said The Mine and Smelter Supply Company, its successors and assigns, the whole right, and all his right, title and interest in and to his invention and improvements in ore concentrators, and in and to the said Letters Patent No. 590,675, which said assignment in writing was duly recorded in Liber B, 73, at page 254, of Transfers of Patents in the Patent Office of the United States, on the 29th day of November, A. D. 1905; and ever since the said purchase by and transfer of the same to your orator as aforesaid, it has been and now is the sole and exclusive owner of the patented improvement and invention, of the said United States letters patent so granted therefor as aforesaid, and of all and singular the rights and privileges granted and intended to be [5] granted by the said letters patent; as by the original of said assignment in writing, or a duly certified copy of the said record

thereof, here in court to be produced as may be required, will more fully and at large appear.

V.

That since the grant, issuance and delivery of said United States letters patent No. 590,675 to the said Arthur R. Wilfley as aforesaid, the improvement in ore concentrators therein set forth, described and claimed, has gone into great and extensive use, and has displaced and superseded to a very great extent all other apparatus and means for ore dressing by concentration designed for said purpose, and except as hereinafter alleged and set forth, the aforesaid exclusive rights and privileges of your orator, and of its said assignor, have been acknowledged and acquiesced in by all persons, firms and corporations using the type of ore dressing apparatus, or ore concentrators using said type of ore-concentrating apparatus, and upwards of twelve thousand (12000) of said patented improvements in ore concentrators have been manufactured, sold and installed, and a world-wide market and demand created therefor by your orator at great expense and large sums of money have been expended by your orator in construction and equipment of a plant for the manufacture thereof and in building up markets therefor, and the exclusive right and privileges granted as aforesaid and secured to your orator by virtue of its ownership of the said letters patent No. 590,675 aforesaid, are of great utility [6] and of great and incalculable value to your orator, and have been and are of great benefit and advantage over other apparatus in the concentration of ores bearing gold, silver, lead and

other metals; and but for the hereinafter set forth wrongful and unlawful acts of the defendant, your orator would have heretofore, and would now enjoy the exclusive right and liberty of making and vending to others to be used, and licensing others to use, ore concentrators embodying and containing said patented invention and improvement, and would have derived and secured, and would now derive and secure great profits and advantages therefrom, and from the manufacture, sale and use of said apparatus and machines, of which the said wrongful and unlawful acts of the said defendant, herein complained of, have deprived and are now depriving your orator.

VI.

That the said defendant has at all times subsequent to the 12th day of January, A. D. 1910, had personal notice and knowledge of the grant and issue of the said letters patent, and of the rights of your orator thereunder and thereto, and was duly notified of the infringement hereinafter complained of, and has continued after such notice, to wit, from and after the 12th day of January, A. D. 1910, to use and operate the infringing devices hereinafter complained of and described.

[7] VII.

And your orator further represents and shows unto your Honor: That heretofore, to wit, on July 17th, A. D. 1899, the said Arthur R. Wilfley, to whom the said United States letters patent No. 590,675 were granted as aforesaid, the said Arthur R. Wilfley being then and there the owner of said letters patent and entitled to the benefits and protec-

tion thereof, with respect to his said invention therein described and claimed, filed his Bill of Complaint, in Equity, in the United States Circuit Court, within and for the District and State of Colorado, against the Denver Engineering Works Company, a corporation organized under and pursuant to the provisions of the general incorporation laws of the State of Colorado, having its principal office and place of business in the City of Denver, in said State, and Ira A. Cammett and Frank E. Shepard, in a certain cause docketed in said court as Cause No. 3927, in equity, alleging an infringement by the said defendants in the said cause of said letters patent No. 590,675, by the manufacture, advertisement and offer for sale and use, and the sale for use and use of a certain mechanical combination or apparatus called by them the "Cammett Concentrating Table" or the "Cammett Concentrator," which embodied and contained the said invention set forth, described and claimed in the said United States letters patent No. 590,675 aforesaid; that thereafter the said defendants answered to the said bill of complaint in said suit and put in issue, *inter alia,* the validity of your orator's said United States letters [8] patent, and as well the alleged infringement thereof; and the said Arthur R. Wilfley, complainant in said cause, filed his general replication thereto; and the said cause thereupon being at issue, voluminous proofs were taken by depositions in said cause, as well on behalf of the defendants as on behalf of the complainant in said cause; and thereafter, and at the May, A. D. 1901 Term of said Court, the said suit in

equity was heard by and before said court, the Honorable John A. Riner presiding, at a full and final hearing upon the issues as made up as aforesaid and proofs of the respective parties, and the same was duly and fully argued by counsel for the respective parties; and afterwards, on due consideration thereof by the said Court, the same having been taken under advisement, on, to wit, the 5th day of November, A. D. 1901, the said United States Circuit Court, within and for the Eighth Judicial Circuit of the United States, and the District and State of Colorado, by said the Honorable John A. Riner, District Judge, then and there presiding, did order and direct a decree in favor of the said complainant in said cause, and ordering, adjudging and decreeing that the said United States letters patent No. 590,675 were and are good and valid in law, and were infringed by the devices manufactured, sold and used by the said defendants; and thereafter, to wit, on said 5th day of November, A. D. 1901, a decree was duly signed by said the Honorable John A. Riner, District Judge, presiding in said court, and filed in said court, wherein and whereby said court ordered, adjudged and decreed that the said letters patent [9] No. 590,675 were and are good and valid in law, and were infringed by the devices manufactured, sold and used by the said defendants in said cause; and ordered, adjudged and decreed that a permanent writ of injunction issue out of and under the seal of said court, enjoining and restraining the said defendants, and each of them, from directly or indirectly making, selling or using in any manner any ore con-

centrator or apparatus containing, embodying or employing the invention secured by the said United States letters patent No. 590,675 aforesaid, all as more fully and at large will appear from the said original decree or a duly certified copy thereof ready here in this court to be produced as may be required; that no appeal has ever been taken from said decree, nor has said decree ever been set aside, vacated or held for naught, but has ever since the entry thereof in said cause continued to be in full force and effect, all of which will be made more fully and at large to appear by the pleadings, files, records and proceedings in the said cause, to which your orator hereby begs leave to refer, and the same or duly certified copies thereof to be produced here in court as may be required.

VIII.

Yet notwithstanding which, and all and singular the matters and things hereinbefore set forth and shown unto your Honor, since the grant, issuance and delivery of the said United States letters patent No. 590,675 to the said Arthur R. Wilfley, and since the transfer thereof as aforesaid to your orator, and [10] during the time that your orator has been the sole and exclusive owner of the said Letters Patent, has had the sole and exclusive right of enjoyment of the exclusive rights and privileges granted thereby, and the sole and exclusive right, liberty and privilege to manufacture, vend and use, and to license others to use, the said patented invention and improvements in ore concentrators therein set forth, described and claimed, and after your

orator had at great expense built up and secured for itself a market and demand for the said patented invention and improvements, and invested large sums of money in and for the manufacture of machines and apparatus embodying the said patented invention and improvements, and after your orator had at great cost and expense demonstrated the utility and efficiency of the said machines and apparatus in the dressing and concentration of ores containing gold, silver, copper, lead and other metals, and the superiority thereof over other means previously in use for that purpose, and had to a very great extent supplanted other apparatus, machines and means previously used for the purpose, not only in the United States and the Territories thereof, but throughout the mining sections of the entire world, the said defendant, well knowing the premises, and having full knowledge and notice of the rights of your orator, and without the license or authority of your orator, and in violation of the exclusive rights and privileges granted [11] and secured to your orator by the said United States letters patent No. 590,675 aforesaid, since your orator has become and during the time your orator has been the sole and exclusive owner of said letters patent, and of the invention and improvements in ore concentrators therein set forth, described and claimed, and entitled to the sole and exclusive enjoyment of the rights and privileges guaranteed thereby, did, at some time prior to the 1st day of January, A. D. 1910, the exact time being unknown to your orator, within the Territory of Arizona, purchase of and from one Emil Deister, or

from the Deister Concentrator Company, both of Fort Wayne, State of Indiana, and the said Emil Deister or the Deister Concentrator Company, or both, did sell to the said defendant, through agencies and interventions unknown to your orator, eight (8) ore concentrators or ore concentrating tables, which are called by the said defendant, and said Emil Deister and said The Deister Concentrator Company, and are known as "Deister Concentrators," containing and embodying the invention and improvements set forth, described and claimed in the said United States letters patent No. 590,675 aforesaid; and thereafter the same were delivered and installed in a mill owned and operated by said defendant at Morenci, Graham County, Territory of Arizona, and thereafter the same were used, and continuously ever since and still are being used in the concentration of ores by said defendant at the place aforesaid, with certain [12] riffles upon the tops or concentrating surfaces thereof, which in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the improvements and invention so patented to the said Arthur R. Wilfley as aforesaid by said hereinbefore described letters patent No. 590,675 now owned by your orator as aforesaid, and especially the improvements covered and protected by the first, second and seventh claims of said letters patent.

IX.

That the said defendant has ever since the purchase and installation of said so-called "Deister Concentrators" in its mill aforesaid, persisted in

using said patented improvements and in operating the said so-called "Deister Concentrators" in its said mill at Morenci, and in Graham County, Territory of Arizona, in the concentration of ores, and, as your orator is informed and verily believes, and upon information and belief alleges, by and with the promise and assurance of protection in such use and operation from and by the said Emil Deister or said The Deister Concentrator Company, or both; and your orator is informed and verily believes, and upon information and belief alleges, that the said defendant intends to continue the perpetration of said infringements upon the rights secured to your orator by said letters patent No. 590,675 aforesaid, and though warned by your orator to desist therefrom, said defendant threatens to continue the use and operation of said so-called "Deister Concentrators" as aforesaid, and **[13]** your orator fears and verily believes that the said defendant will, in future, continue to so infringe upon the exclusive rights secured to your orator as aforesaid by the use and operation of said so-called "Deister Concentrators" so infringing the letters patent of your orator as aforesaid; that by reason of the said violations and infringements of the said exclusive rights of your orator in and to the inventions and improvements in ore concentrators set forth, described and claimed in the United States letters patent No. 590,675 aforesaid by the said defendant, your orator has been, and is being deprived of large profits, benefits and advantages which might and otherwise would accrue to your orator, and the said defendant

has been and is now enjoying large profits, benefits and advantages from the practice of the said infringements which should accrue to your orator; and your orator avers, that the said wrongful and unlawful acts of infringement so practiced by the said defendant as aforesaid have caused and are causing your orator great and irreparable damage and injury, and that the damages so accruing to your orator by reason thereof are extremely difficult, if not quite impossible of definite ascertainment, by reason of the great variety and range of efficiency of numerous other means, machines and apparatus known to the art and used in the practice of ore dressing, in the treatment of ores of various composition and complexity; and your orator avers, that by reason of the premises your orator has no adequate [14] remedy at law in an action for damages by reason of the practice of the said infringements by the said defendant; and your orator alleges upon information and belief, that the profits of which your orator has been deprived, and which have accrued to the said defendant, and the damages which have been suffered by your orator by the wrongful and unlawful infringing acts of the said defendant herein complained of, amount to the sum of Ten Thousand Dollars ($10,000.00).

That for the wrongs and injuries herein complained of your orator has no plain, speedy or adequate remedy at law, and forasmuch as your orator is without remedy save in a court of equity where matters of this kind are properly cognizable and relievable.

To the end, therefore, that the said defendant may, if it can, show why your orator should not have the relief herein prayed, and may, according to the best and utmost of its knowledge, remembrance, information and belief, full, true, direct and perfect answer make to all and singular the matters hereinbefore stated and charged, but not under oath, answer under oath being hereby expressly waived.

And your orator further prays, that the said defendant may be decreed to account for and pay over unto your orator all gains and profits thus unlawfully derived from the infringement and violation of your orator's said letters patent No. 590,675 and of all of your orator's rights thereunder; and the **[15]** damages sustained by your orator by reason of such violation and infringement of said rights or letters patent, your orator prays that your Honor may grant a writ of injunction, issuing out of and under the seal of this Honorable Court, perpetually enjoining and restraining the said defendant, its agents, attorneys, servants, employees, workmen and associates, and each and every of them, from any further use and operation in any manner of your orator's said inventions and improvements covered, described and claimed in the said letters patent aforesaid, or any part thereof, in violation of your orator's rights as aforesaid; and that your Honor, upon rendering the decree above prayed, may assess, or cause to be assessed, in addition to the gains and profits to be accounted for as aforesaid, the damages your orator has sustained by reason of said infringements, and that your Honor may increase the actual

damages so assessed to a sum three times the amount of such assessment under the circumstances of the wilful and unjust infringements of said defendant as herein set forth; and your orator further prays that a provisional or preliminary injunction be issued out of and under the seal of this Honorable Court enjoining and restraining the said defendant, its agents, attorneys, servants, employees, workmen and associates, and each and every of them during the pendency of this suit, from any further infringement of said letters patent No. 590,675 and of all of your orator's rights thereunder, and from continuing **[16]** the use and operation of said patented inventions and improvements; and your orator further prays that the ore concentrators or ore concentrating tables or apparatus now in the possession of or under the control of the said defendant and infringing the rights and letters patent of your orator as aforesaid, and each and every of them, may be destroyed under the orders of this court; and for such other and further relief as the equity of the case may require and to your Honor may seem meet.

May it please your Honor to grant unto your orator not only a writ of injunction conformable to the prayer of this Bill of Complaint, but also a writ of subpoena of the United States of America, directed to the said defendant, commanding it on a day certain to appear and answer unto this Bill of Complaint, and abide and perform such order and decree in the premises as the Court may deem proper and

be required by the principles of equity and good conscience.

And your orator will ever pray, etc.

Dated this 18th day of February, A. D. 1910.

THE MINE AND SMELTER SUPPLY COMPANY.

By A. H. SEEP,
Vice-President.

FREDRICK S. NAVE,
Solicitor for Complainant.

GEO. L. HODGES.
D. EDGAR WILSON.
Of Counsel for Complainant,
603–7 Ernest & Chanmer Bldg.
Denver, Colorado.

[17] State of Colorado,
City and County of Denver,—ss.

A. H. Seep, being first duly sworn, on his oath deposes and says: That he is the Vice-President of The Mine and Smelter Supply Company, a corporation, and the complainant named in the above and foregoing Bill of Complaint; that he has read the said Bill of Complaint and knows the contents thereof, and that the matters and things therein stated are true of his own knowledge, except as to those matters and things as are therein stated to be made upon information and belief, and as to such matters and things he verily believes the same to be true.

A. H. SEEP.

Subscribed and sworn to before me, this 18th day of February A. D. 1910.

My Commission expires February 23rd, 1911.

HORACE U. KENNEDY,
Notary Public.

[Endorsements]: No. 11 (1). In Equity. United States of America. Territory of Arizona. The Mine & Smelter Supply Company, a Corporation, Complainant, vs. Detroit Copper Mining Company, of Arizona, a Corporation, Defendant. Bill of Complaint. Filed at 11:30 A. M., February 24, 1910. George H. Smalley, Clerk. Filed March 13, [18] 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.

21A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,
Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,
Defendant.

Bill of Complaint [of Mine and Smelter Supply Co. Against Arizona Copper Co.].

THE MINE AND SMELTER SUPPLY COM-

PANY, a corporation duly organized and existing under and by virtue of the general incorporation laws of, and doing business in the State of Colorado, and having its principal office and place of business in the City and County of Denver in said State, brings this Bill of Complaint against the ARIZONA COPPER COMPANY, a corporation organized and existing under and by virtue of the general incorporation laws of, and doing business in the County of Graham in the Territory of Arizona; and thereupon your orator complains and shows unto your Honor:

I.

That heretofore, to wit, prior to March 16th, A. D. 1897, Arthur R. Wilfley, who then was, ever since has been, and now is a citizen of the United States and of the State of Colorado, [19] residing in and an inhabitant of the City and County of Denver in said State, was the original, first and sole inventor of a certain new and useful improvement in ore concentrators; that the same was a new and useful invention, and was not known to or used by others in the United States, and was not patented or described in any printed publication in the United States, or any foreign country, before the said Arthur R. Wilfley's invention or discovery thereof, and the same was not in public use or on sale for more than two years prior to the application of the said Arthur R. Wilfley for United States Letters Patent therefor, and that the same has never been abandoned; a more particular description of which invention will be found in the

United States Letters Patent hereinafter referred to.

II.

That the said Arthur R. Wilfley, so being the original, first and sole inventor of said improvements, heretofore, to wit: on the 16th day of March A. D. 1897, made application in writing, in due form of law, to the United States Commissioner of Patents, in accordance with the provisions of the then existing laws of the United States in such case made and provided, for Letters Patent of the United States for his said invention, and in respect thereto complied with all the conditions and requirements of said laws, and of the rules of practice of the United States Patent Office in such case made and provided.

III.

That all the requirements of the laws and of the rules of practice [20] of the United States Patent Office in such case made and provided, having been fully complied with by the said Arthur R. Wilfley as aforesaid, and upon due proceedings had in said Patent Office of the United States in full accordance therewith, relating to the granting and issuance of United States letters patent for inventions, and after due examination made by the United States Commissioner of Patents, as to the novelty and patentability of the said invention as required by law, and the aforesaid invention and improvements in ore concentrators having been found by the Commissioner of Patents to be novel and patentable under and in accordance with the said laws and the

rules of practice of the said United States Patent Office, thereafter, to wit, on September 28th, A. D. 1897, letters patent of the United States, bearing the date last aforesaid, Numbered 590,675, signed, sealed and executed in due form of law, were granted, issued and delivered by the United States Commissioner of Patents to the said Arthur R. Wilfley, his heirs, legal representatives and assigns, under the seal of the Patent Office of the United States, signed by the Assistant Secretary of the Interior, and countersigned by the said Commissioner of Patents, whereby there was granted and secured to the said Arthur R. Wilfley, his heirs and assigns, for the full term of seventeen (17) years from and after said last named date, to wit, September 28th, A. D. 1897, the sole and exclusive right, liberty and privilege to make, use and vend [21] the said invention throughout the United States of America and the Territories thereof, as by said original letters patent No. 590,675 or a duly certified copy thereof, here in court to be produced as may be required, will more fully and at large appear.

IV.

That thereafter, on, to wit, the 12th day of October, A. D. 1905, by his assignment in writing, duly executed and acknowledged, and bearing the date last aforesaid, the said Arthur B. Wilfley, for a good and valuable consideration, did sell, assign, transfer and convey unto your orator, said The Mine and Smelter Supply Company, its successors and assigns, the whole right, and all his right, title and interest in and to his invention and improve-

ments in ore concentrators, and in and to the said Letters Patent No. 590,675, which said assignment in writing was duly recorded in Liber B. 73, at page 254, of Transfers of Patents in the Patent Office of the United States, on the 29th day of November, A. D. 1905; and ever since the said purchase by and transfer of the same to your orator as aforesaid, it has been and now is the sole and exclusive owner of the patented improvement and invention, of the said United States letters patent so granted therefor as aforesaid, and of all and singular rights and privileges granted and intended to be granted by the said letters patent; as by the original of said assignment in writing, or a duly certified copy of the said record thereof, here in court to be produced as [22] may be required, will more fully and at large appear.

V.

That since the grant, issuance and delivery of said United States Patent No. 590,675, to the said Arthur R. Wilfley as aforesaid, the improvement in ore concentrators therein set forth, described and claimed, has gone into great and extensive use, and has displaced and superseded to a very great extent all other apparatus and means for ore dressing by concentration designed for said purpose, and except as hereinafter alleged and set forth, the aforesaid exclusive rights and privileges of your orator, and of its said assignor, have been acknowledged and acquiesced in by all persons, firms, and corporations using the type of ore-concentrating apparatus, and upwards of twelve thousand (12,000) of said patented improvements in ore concentrators have been manufactured,

sold and installed, and a world-wide market and demand created therefor by your orator at great expense, and large sums of money have been expended by your orator in construction and equipment of a plant for the manufacture thereof and in building up markets therefor, and the exclusive right and privileges granted as aforesaid and secured to your orator by virtue of its ownership of the said letters patent No. 590,675, aforesaid, are of great utility and of great and incalculable value to your orator, and have been and are of great benefit and [24] advantage over other apparatus in the concentration of ores bearing gold, silver, lead and other metals; and but for the hereinafter set forth wrongful and unlawful acts of the defendant your orator would have heretofore, and would now enjoy the exclusive right and liberty of making and vending to others to be used, and licensing others to use, ore concentrators embodying and containing said patented invention and improvement, and would have derived and secured, and would now derive and secure great profits and advantages therefrom, and from the manufacture, sale and use of said apparatus and machines, of which the said wrongful and unlawful acts of the said defendant, herein complained of, have deprived and are now depriving your orator.

VI.

That the said defendant has at all times subsequent to the 12th day of January, A. D. 1910, had personal notice and knowledge of the grant and issue of said letters patent, and of the rights of your orator thereunder and thereto, and was duly notified of the in-

fringement hereinafter complained of, and has continued after such notice, to wit, from and after the 12th day of January, A. D. 1910, to use and operate the infringing devices hereinafter complained of and described.

VII.

And your orator further represents and shows unto your Honor: That heretofore, to wit, on July 17th, A. D. 1899, the said [25] Arthur R. Wilfley, to whom the said United States letters patent No. 590,675, were granted as aforesaid, the said Arthur R. Wilfley being then and there the owner of said letters patent and entitled to the benefits and protection thereof, with respect to his said invention therein described and claimed, filed his bill of complaint, in equity, in the United States Circuit Court, within and for the District and State of Colorado, against the Denver Engineering Works Company, a corporation organized under and pursuant to the provisions of the general incorporation laws of the State of Colorado, having its principal office and place of business in the City of Denver, in said State, and Ira A. Cammett and Frank E. Shepard, in a certain cause docketed in said Court and Cause No. 3927, in equity, alleging an infringement by the said defendants in the said cause of said letters patent No. 390,675 by the manufacture, advertisement and offer for sale and use, and the sale for use and use of a certain mechanical combination or apparatus called by them the "Cammett Concentrating Table" or the "Cammett Concentrator," which embodied and contained the said invention set forth, described and claimed in the said

United States letters patent No. 590,675 aforesaid; that thereafter the said defendants answered to the said bill of complaint in said suit and put in issue, *inter alia,* the validity of your orator's said United States letter patent, and as well the alleged infringement thereof; and the said Arthur R. Wilfley, complainant in said [26] cause filed his general replication thereto and the said cause, thereupon being at issue, voluminous proofs were taken by depositions in said cause, as well on behalf of the defendants as on behalf of the complainant in said cause; and thereafter and at the May, A. D. 1901 Term of said Court, the said suit in equity was heard by and before said court, the Honorable John A. Riner presiding, at a full and final hearing upon the issues as made up as aforesaid and proofs of the respective parties, and the same was duly and fully argued by counsel for the respective parties; and afterwards, on due consideration thereof by the said court, the same having been taken under advisement on, to wit, the 5th day of November, A. D. 1901, the said United States Circuit Court, within and for the Eighth Judicial Circuit of the United States, and the District and State of Colorado, by said the Honorable John A. Riner, District Judge, then and there presiding, did order and direct a decree in favor of the said complainant in said cause, and ordering, adjudging and decreeing that the said United States letters patent No. 590,675 were and are good and valid in law, and were infringed by the devices manufactured, sold and used by the said defendants; and thereafter, to wit, on said 5th day of November, A. D. 1901, a decree was duly

signed by said the Honorable John A. Riner, District Judge, presiding in said court, and filed in said court, wherein and whereby said court ordered, adjudged and decreed that the said letters [27] were and are good and valid in law, and were infringed by the devices manufactured, sold and used by the said defendants in said cause; and ordered, adjudged and decreed that a permanent writ of injunction issue out of and under the seal of said court, enjoining and restraining the said defendants and each of them, from directly or indirectly making, selling or using in any manner any ore concentrator or apparatus containing, embodying or employing the invention secured by the said United States letters patent 590,-675 aforesaid, all as more fully and at large will appear from the said original decree or a duly certified copy thereof ready here in this court to be produced as may be required; that no appeal has ever been taken from said decree, nor has said decree ever been set aside, vacated or held for naught, but has ever since the entry thereof in said cause continued to be in full force and effect, all of which will be made more fully and at large to appear by the pleadings, files, records, and proceedings in the said cause, to which your orator hereby begs leave to refer, and the same or duly certified copies thereof to be produced here in court as may be required.

VIII.

Yet notwithstanding which, and all and singular the matters and things hereinbefore set forth and shown unto your Honor, since the grant, issuance and delivery of the said United States letters patent No.

590,675 to the said Arthur R. Wilfley, and since the transfer thereof as aforesaid to your orator, and during the time that your orator has been the sole and exclusive owner of the said letters patent, has had the sole and exclusive right of enjoyment of the exclusive rights and privileges granted thereby, and the sole and exclusive right, liberty and privilege to manufacture, vend and use, and to license others to use, the [28] said patented invention and improvements in ore concentrators therein set forth, described and claimed, and after your orator had at great expense built up and secured for itself a market and demand for the said patented invention and improvements, and invested large sums of money in and for the manufacture of machines and apparatus embodying the said patented invention and improvements, and after your orator had at great cost and expense demonstrated the utility and efficiency of the said machines and apparatus in the dressing and concentration of ores containing gold, silver, copper, lead, and other metals, and the superiority thereof over other means previously in use for that purpose, and had to a very great extent supplanted other apparatus, machines and means previously used for the purpose, not only in the United States and the Territories thereof, but throughout the mining sections of the entire world, the said defendant, well knowing the premises, and having full knowledge and notice of the rights of your orator in the premises, and against the will of your orator, and in violation of the exclusive rights and privileges granted and secured to your orator by the said United States letters patent No. 590,675

aforesaid, since your orator has become, and during the time your orator has been the sole and exclusive owner of said letters patent, and of the invention and improvements in ore concentrators therein set forth, described and claimed, and entitled to the sole and exclusive enjoyment of the rights and privileges guaranteed thereby, did, at some time prior to the 1st day of December, A. D. [29] 1909, the exact time being unknown to your orator, within the Territory of Arizona, purchase of and from one Emil Deister, or from the Deister Concentrator Company, both of Fort Wayne, State of Indiana, and the said Emil Deister or said the Deister Concentrator Company, or both, did sell to the said defendant, through agencies and interventions unknown to your orator, twelve (12) ore concentrators or ore concentrating tables, which are called by the said defendant, and said Emil Deister and said the Deister Concentrator Company, and are known as "Deister Concentrators," containing and embodying the invention and improvements set forth, described and claimed in the said United States letters patent No. 590,675 aforesaid; and thereafter the same were delivered and installed in a mill owned and operated by said defendant at Morenci, Graham County, Territory of Arizona, and thereafter the same were used, and continuously ever since and still are being used in the concentration of ores by said defendant at the place aforesaid, with certain riffles upon the tops or concentrating surfaces thereof, which in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the im-

provements and invention so patented to the said Arthur R. Wilfley as aforesaid by said hereinbefore described letters [30] patent No. 590,675, now owned by your orator as aforesaid, and especially the improvements covered and protected by the first, second, and seventh claims of said letters patent.

IX.

That the said defendant has ever since the purchase and installation of said so-called "Deister Concentrators" in its mill aforesaid, persisted in using said patented improvements and in operating the said so-called "Deister Concentrators" in its said mill at Morence, in Graham County, Territory of Arizona, in the concentration of ores, and, as your orator is informed and verily believes, and upon information and belief alleges, by and with the promise and assurance of protection in such use and operation from and by the said Emil Deister, or said The Deister Concentrator Company, or both; and your orator is informed and verily believes, and upon information and belief alleges, that the said defendant intends to continue the perpetration of said infringements upon the right secured to your orator by said letters patent No. 590,675 aforesaid, and though warned by your orator to desist therefrom, said defendant threatens to continue the use and operation of said so-called "Deister Concentrators" as aforesaid, and said defendant has advised your orator that it will continue so to do and that it has the right so to do, and your orator fears and verily believes that the said defendant will, in future, [31] continue to so infringe upon the exclusive rights secured to

your orator as aforesaid by the use and operation of said so-called "Deister Concentrators" so infringing the letters patent of your orator as aforesaid; that by reason of the said violations and infringements of the said exclusive rights of your orator in and to the inventions and improvements in ore concentrators set forth, described and claimed in the United States letters patent No. 590,675 aforesaid by the said defendant, your orator has been, and is being deprived of large profits, benefits and advantages which might and otherwise would accrue to your orator, and the said defendant has been and is now enjoying large profits, benefits and advantages from the practice of the said infringements which should accrue to your orator; and your orator avers, that the said wrongful and unlawful acts of infringement so practiced by the said defendant as aforesaid have caused and are causing your orator great and irreparable damage and injury, and that the damages so accruing to your orator by reason thereof are extremely difficult, if not quite impossible of definite ascertainment, by reason of the great variety and range of efficiency of numerous other means, machines and apparatus known to the art and used in the practice of ore dressing, in the treatment of ores of various composition and complexity; and your orator avers that by reason of the [32] premises your orator has no adequate remedy at law in an action for damages by reason of the practice of the said infringements by the said defendant; and your orator alleges upon information and belief, that the profits of which your orator has been deprived, and which have accrued

to the said defendant, and the damages which have been suffered by your orator by the wrongful and unlawful infringing acts of the said defendant herein complained of, amount to the sum of Fifteen Thousand Dollars ($15,000.00).

That for the wrongs and injuries herein complained of your orator has no plain, speedy or adequate remedy at law, and forasmuch as your orator is without remedy save in a court of equity where matters of this kind are properly cognizable and relievable;

To the end, therefore, that the said defendant may, if it can, show why your orator should not have the relief herein prayed and may, according to the best and utmost of its knowledge, remembrance, information, and belief, full, true, direct and perfect answer make to all and singular the matters hereinbefore stated and charged, but not under oath, answer under oath being hereby expressly waived.

And your orator further prays, that the said defendant may be decreed to account for and pay over unto your orator all gains and profits thus unlawfully derived from the infringement [33] and violation of your orator's said Letters Patent No. 590,675, and of all of your orator's rights thereunder; and the damages sustained by your orator by reason of such violation and infringement of said rights or letters patent, your orator prays that your Honor may grant a writ of injunction, issuing out of and under the seal of this Honorable Court, perpetually enjoining and restraining the said defendant, its agents, attorneys, servants, employees, workmen and

associates, and each and every of them, from any further use and operation in any manner of your orator's said inventions and improvements covered, described and claimed in the said letters patent aforesaid; and that your Honor, upon rendering the decree above prayed, may assess, or cause to be assessed, in addition to the gains and profits to be accounted for as aforesaid, the damages your orator has sustained by reason of said infringements, and that your Honor may increase the actual damages so assessed to a sum three times the amount of such assessment under the circumstances of the wilful and unjust infringements of said defendant as herein set forth; and your orator further prays that a provisional or preliminary injunction be issued out of and under the seal of this Honorable Court enjoining and restraining the said defendant, its agents, attorneys, servants, employees, workmen and associates, and each and every of them, during the pendency of this suit, from any further infringement of said letters [34] patent No. 590,675, and of all of your orator's rights thereunder, and from continuing the use and operation of said patented inventions and improvements; and your orator further prays that the ore concentrators or ore concentrating tables or apparatus now in the possession of or under the control of the said defendant and infringing the rights and letters patent of your orator as aforesaid, and each and every of them, may be destroyed under the orders of this court; and for such other and further relief as the equity of the case may require and to your Honor may seem meet.

May it please your Honor to grant unto your

orator not only a writ of injunction conformable to the prayer of this Bill of Complaint, but also a writ of subpoena of the United States of America, directed to the said defendant, commanding it on a day certain to appear and answer unto this Bill of Complaint, and abide and perform such order and decree in the premises as the Court may deem proper and be required by the principles of equity and good conscience.

And your orator will ever pray, etc.

Dated this 18th day of February, A. D. 1910.

THE MINE AND SMELTER SUPPLY COMPANY,

By A. H. SEEP,
Vice-President.

[35] FREDERICK S. NAVE,
Solicitor for Complainant.

GEO. L. HODGES,
D. EDGAR WILSON,
Of Counsel for Complainant,
603–7 Ernest & Cranmer Building,
Denver, Colorado.

State of Colorado,
City and County of Denver,—ss.

A. H. Seep, being first duly sworn, on his oath deposes and says: That he is the Vice-president of The Mine and Smelter Supply Company, a corporation, and the complainant named in the above and foregoing Bill of Complaint; that he has read the said Bill of Complaint and knows the contents thereof, and that the matters and things therein stated are true of his own knowledge except as to those matters and

things as are therein stated to be made upon information and belief, and as to such matters and things he verily believes the same to be true.

A. H. SEEP.

Subscribed and sworn to before me, this 18th day of February, [36] A. D. 1910.

My Commission expires February 23, 1911.

HORACE A. KENNEDY,
Notary Public.

[Endorsements]: No. 12 (1). In Equity. United States of America, Territory of Arizona. The Mine and Smelter Supply Company, a Corporation, Complainant, vs. Arizona Copper Company, a Corporation, Defendant. Filed at 10:30 o'clock A. M., February 24, 1910. George H. Smalley, Clerk. Filed March 13, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy. Bill of Complaint.

UNITED STATES OF AMERICA.

In the District Court of the Fifth Judicial District, of the Territory of Arizona, Having and Exercising the Same Jurisdiction Under the Constitution and Laws of the United States as is Vested in the District and Circuit Courts of the United States.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY, OF ARIZONA, a Corporation,

Defendant.

Summons [in Case No. 20A].

[37] Action brought in the District Court of the Fifth Judicial District, Territory of Arizona.

The United States of America, Territory of Arizona, Sends Greeting to Detroit Copper Mining Company of Arizona, a Corporation.

You are hereby summoned and required to appear in an action brought against you by the above-named plaintiff in the District Court of the Fifth Judicial District of the Territory of Arizona, and answer the complaint filed with the Clerk of this court at Globe in said District (a copy of which complaint accompanies this summons) within twenty days (exclusive of the day of service) after the service upon you of this summons, if served in this County; but if served out of the County and within this District, then within thirty days; in all other cases forty days.

And you are hereby notified that if you fail to appear and answer the complaint as above required, the plaintiff will apply to the Court for the relief therein demanded and costs and disbursements in this behalf expended.

Given Under My Hand and the Seal of said District Court, at Globe, this 24th day of February, 1910.

[Seal] GEORGE H. SMALLEY,

Clerk.

Office of the United States Marshal,
For the Territory of Arizona,—ss.

[38] I HEREBY CERTIFY that I received the within summons on the 26th day of February, A. D. 1910, and personally served the same on the 8th day of March, A. D. 1910, on Charles E. Mills, he being the Statutory Agent of the within named defendant corporation, being the defendant named in the summons, by delivering it, and leaving with said defendant personally, in the County of Graham, a copy of said summons, together with a true and correct copy of the complaint in this action.

C. A. OVERLOCK,
Marshal.
By D. N. Willits,
Deputy Marshal.

Marshal's Fees and Expenses:

Service 1 person	$4.00
Expenses	35.15
	$39.15

[Endorsements]: No. 11 (3). Marshal's Docket #231. United States of America, District Court, Fifth Judicial District, Territory of Arizona. The Mine & Smelter Supply Company, a Corporation, Plaintiff, vs. Detroit Copper Mining Company, of Arizona, a Corporation, Defendant. Filed March 12th, 1910. George H. [39] Smalley, Clerk. By Elsie Patton, Deputy Clerk. Filed March 13th, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

UNITED STATES OF AMERICA.

In the District Court of the Fifth Judicial District, of the Territory of Arizona, Having and Exercising the Same Jurisdiction Under the Constitution and Laws of the United States as is Vested in the District and Circuit Courts of the United States.

No. 12.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

Summons [in Case No. 21A].

Action brought in the District Court of the Fifth Judicial District, Territory of Arizona.

The United States of America, Territory of Arizona, Sends Greeting to Arizona Copper Company, a Corporation.

You are hereby summoned and required to appear in an action brought against you by the above-named plaintiff in the District Court of the Fifth Judicial District of the Territory of Arizona, and answer the complaint filed with the Clerk of this court at Globe in said District (a copy of which complaint [40] accompanies this summons) within twenty days (exclusive of the day of service) after the service upon you of this summons, if served in this county; but if served out of the county and within this district, then

within thirty days; in all other cases forty days.

And you are hereby notified that if you fail to appear and answer the complaint as above required, the plaintiff will apply to the Court for the relief therein demanded and costs and disbursements in this behalf expended.

Given under my hand, and the seal of said District Court, at Globe, this 24th day of February, 1910.

[Seal] GEORGE H. SMALLEY,
Clerk.

Office of the United States Marshal,
For the Territory of Arizona,—ss.

I HEREBY CERTIFY that I received the within summons on the 26th day of February, A. D. 1910, and personally served the same on the 7th day of March, A. D. 1910, on Alexander Torrence Thompson, he being the Statutory Agent of the within-named defendant corporation, being the defendant named in the summons, by delivering it, and leaving with said defendant personally, in the county of Graham, a copy of said summons, together with a true and correct copy of the complaint in this action.

[41] C. A. OVERLOCK,
Marshal.
By D. N. Willits,
Deputy Marshal.

Marshal's Fees:

Service 1 person	$ 4.00
Mileage	28.08
	$32.08

[Endorsements]: No. 12. (2). Docket No. 232. No. 21A. United States of America, District Court, Fifth Judicial District, Territory of Arizona. The Mine & Smelter Supply Company, a Corporation, Plaintiff, vs. Arizona Copper Company, a Corporation, Defendant. Filed March 12, 1910. George H. Smalley, Clerk. By Elsie Patton, Deputy Clerk. Filed March 13, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Laws and Constitution of the United States as is Vested in the Circuit and District Courts of the United States.

[42] No. 20A.—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

Answer [of Detroit Copper Mining Co.].

The said defendant, the DETROIT COPPER MINING COMPANY OF ARIZONA, for answer to the Bill of Complaint of the complainant, answering, says:

I.

The defendant admits that it is a corporation organized and existing under the laws of the State of Michigan and doing business at Morenci, in the County of Graham, in the Territory of Arizona and that the complainant is a corporation organized under the laws of the State of Colorado, and having its principal office and place of business at Denver, in the County of Denver in said State.

II.

And the defendant, answering further, admits that a patent dated September 28, 1897, and numbered 590,675, was granted by the United States Commissioner of Patents to one Arthur R. Wilfley for improvements in ore concentrators, but whether **[43]** the said Arthur R. Wilfley was the original, first and sole inventor of the said improvements the defendant does not know, and it has no knowledge whether the said patent was applied for and issued in due form of law; and it has no knowledge whether the said Arthur R. Wilfley, after the grant of said patent, assigned, transferred and conveyed to the complainant all his interest in and to his invention and improvements in ore concentrators and in and to said Letters Patent; and as to all those matters it leaves the complainant to make proof as it may be advised.

III.

And the defendant, answering further, says that it has no knowledge whether the improvements in ore concentrators set forth, described and claimed

in said patent have gone into great and extended use and have displaced and superseded to a great extent all other apparatus and means for ore dressing by concentration, or whether others have acknowledged and acquiesced in the complainant's claims under patent, or whether twelve thousand or any other number of said patented improvements have been made, or whether large sums of money have been expended by the complainant in the construction and equipment of a plant for the manufacture thereof; and as to all those matters it leaves the complainant to make proof as it may be advised.

IV.

And said defendant, answering further, says that as to [44] the alleged prior suit by said Arthur R. Wilfley against the Denver Engineering Works Company, Ira A. Cammett and Frank E. Shepard, and the proceedings and judgment therein it has no knowledge and leaves the complainant to make proof as it may be advised.

V.

And said defendant, answering further, denies that it has at any time purchased from anyone, owned, or used any ore concentrator, or ore concentrating tables containing and embodying the invention and improvements set forth, described and claimed in said United States Letters Patent 590,675; and denies that it has ever used, or is using any ore concentrators, or ore concentrating tables with riffles upon the tops or concen-

trating surfaces thereof which, in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the improvements and invention so patented to said Arthur R. Wilfley by said patent 590,675, or infringe the first, second and seventh claims of said patent, or any of them, or any of its claims.

VI.

And said defendant, answering further, says that the art of making and using ore concentrators and ore concentrating tables was an old and well known art, and such concentrators and concentrating tables had been made and patented and used in many forms before the said Arthur R. Wilfley made the inventions [45] or produced the apparatus described in said patent 590,675: and in support of this averment and to show the state of the prior art the defendant will offer in evidence to be read at the final hearing the following United States patents; and if others shall come to its knowledge before the final hearing, it will ask leave to incorporate them into this answer by amendment or notice:

No. 35,197, Baron, May 6, 1862.
No. 70,914, Stiles, Nov. 12, 1867.
No. 149,622, Wilder, Apr. 14, 1874.
No. 159,347, Nevin, Feb. 2, 1875.
No. 258,879, Blatchley & K., June 6, 1882.
No. 349,504, Krause, Sept. 21, 1886.
No. 415,999, Gates, Nov. 26, 1889.
No. 439,962, Look, Nov. 4, 1890.
No. 513,849, Waitt, Jan. 30, 1894.

No. 528,242, Look, Sept. 18, 1894.
No. 528,503, Chatterson, Oct. 30, 1894.
No. 533,362, Lampert, Jan. 19, 1895.
No. 565,812, Stoddard, Aug. 11, 1896.
No. 566,533, Pike, Aug. 25, 1896.
No. 566,534, Pike, Aug. 25, 1896.

VII.

And said defendant, answering further, says that inasmuch as the invention described and claimed in said patent 590,675 was for a narrow and specific improvement in an old art said **[46]** patent is to be construed and limited accordingly, and that it must be taken to apply only to apparatus covered clearly and closely by its specification and claims, and that the defendant has never owned, or used any ore concentrators, or concentrating tables covered by the claims of said patent so construed and applied.

VIII.

And said defendant, answering further, says that it denies all infringement of any exclusive rights secured to the complainant by said patent 590,675, and all profits by it from any such infringement, and all damages to the complainant by reason of any such infringement by it; and it denies all the material allegations of the said bill of complaint not hereinbefore referred to and herein admitted, denied, or answered.

All of which defenses this defendant is ready to prove as the Court shall direct, and it prays to be

discharged hence with its costs in this behalf incurred.

THE DETROIT COPPER MINING COMPANY OF ARIZONA.

Per C. E. MILLS,
Superintendent and Agent.

W. K. FLORA,
E. E. ELLINWOOD,
Attorneys and Solicitors for Defendant.
R. S. TAYLOR,
E. M. HULSE,
Of Counsel for the Defendant.

[47] Received copy of the written answer of defendant in case of The Mine and Smelter Supply Company, a Corporation, Complainant, vs. Detroit Copper Mining Company of Arizona, a Corporation, Defendant, in Equity, No. 20A, United States Court, Fifth District, Arizona, this 4th day of April, 1910.

FREDERICK S. NAVE,
Attorney and Solicitor for the Complainant.

[Endorsements]: No. 11 (4). No. 20A. In Equity. In the District Court of the Fifth Judicial District of the Territory of Arizona Having and Exercising the Same Jurisdiction in all Cases Arising Under the Laws and Constitution of the United States as is Vested in Circuit and District Courts of the United States. The Mine & Smelter Supply Co., a Corporation, Complainant, vs. Detroit Copper Mining Company of Arizona, a Corporation, Defendant. Filed April 4th, 1910. Geo. H. Smalley, Clerk. Filed March 13, 1912. Allan B.

Jaynes, Clerk. By W. E. Boggs, Deputy. E. E. Ellinwood, W. K. Flora, Attorneys and Solicitors for Defendant. R. S. Taylor, E. M. Hulse, of Counsel.

[48] *In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.*

No. 20A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

Answer [of Arizona Copper Co.].

The said defendant, the Arizona Copper Company, for answer to the Bill of Complaint of the complainant, answering says:

I.

The defendant admits that it is a corporation organized and existing under and by virtue of the general incorporation laws of, and doing business in the County of Graham in the Territory of Arizona; and that the complainant is a corporation organized under the laws of the State of Colorado, and having its principal office and place of business at Denver, in the County of Denver in said State.

II.

And the defendant, answering further, admits that a patent dated September 28, 1897, and numbered 590,675, was granted by the United States Commissioner of Patents to one Arthur R. Wilfley for improvements in ore concentrators, but whether the said Arthur **[49]** R. Wilfley was the original, first and sole inventor of the said improvements the defendant does not know, and it has no knowledge whether the said patent was applied for and issued in due form of law; and it has no knowledge whether the said Arthur R. Wilfley, after the grant of said patent, assigned, transferred and conveyed to the complainant all his interest in and to his said invention and improvements in ore concentrators and in and to said Letters Patent; and as to all those matters it leaves the complainant to make proof as it may be advised.

III.

And the defendant, answering further, says that it has no knowledge whether the improvements in ore concentrators set forth, described and claimed in said patent have gone into great and extended use and have displaced and superseded to a great extent all other apparatus and means for ore dressing by concentration, or whether others have acknowledged and acquiesced in the complainant's claims under said patent, or whether twelve thousand or any other number of patented improvements have been made, or whether large sums of money have been expended by the complainant in the construction and equipment of a plant for the

manufacture thereof; and as to all these matters it leaves the complainant to make proof as it may be advised.

IV.

And the defendant, answering further, says that as [50] to the alleged prior suit by said Arthur R. Wilfley against the Denver Engineering Works Company, Ira A. Cammett and Frank E. Shepard, and the proceedings and judgment therein it has no knowledge and leaves the complainant to make proof as it may be advised.

V.

And said defendant, answering further, denies that it has at any time purchased from anyone, owned, or used any ore concentrator, or ore concentrating tables containing and embodying the invention and improvements set forth, described and claimed in said United States letters patent 590,675; and denies that it has ever used, or is using any ore concentrators, or ore concentrating tables with riffles upon the tops or concentrating surfaces thereof, which in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the improvements and invention so patented to said Arthur R. Wilfley by said patent 590,675, or infringe the first, second and seventh claims of said patent, or any of them, or any of its claims.

VI.

And said defendant, answering further, says that the art of making and using ore concentrators and ore concentrating tables was an old and well-known art, and such concentrators and concentrating table

had been made and patented and used in many forms before the said Arthur R. Wilfley made the inventions or produced the apparatus described in said [51] patent 590,675; and in support of this averment and to show the state of the prior art the defendant will offer in evidence to be read at the final hearing the following United States patents; and if others shall come to its knowledge before the final hearing, it will ask leave to incorporate them into this answer by amendment or notice:

No. 35,197, Baron, May 6, 1862.
No. 70, 914, Stiles, Nov. 12, 1867.
No. 149,622, Wilder, April 14, 1874.
No. 159,347, Nevin, Feb. 2, 1875.
No. 258,879, Blatchley & K., June 6, 1882.
No. 349,504 Krause, Sept. 21, 1886.
No. 415,999, Gates, Nov. 26, 1889.
No. 439,962, Look, Nov. 14, 1890.
No. 513,849, Waitt, Jan. 30, 1894.
No. 526,242, Look, Sept. 18, 1894.
No. 528,503, Chatterson, Oct. 30, 1894.
No. 533,362, Lampert, Jan. 19, 1895.
No. 565,812, Stoddard, Aug. 11, 1896.
No. 566,533, Pike, Aug. 25, 1896.
No. 566,534, Pike, Aug. 25, 1896.

VII.

Said defendant, answering further, says that inasmuch as the invention described and claimed in said patent 590,675 [52] was for a narrow and specific improvement in an old art, said patent is to be construed and limited accordingly, and that it must be taken to apply only to apparatus covered

clearly and closely by its specification and claims, and that the defendant has never owned or used any ore concentrators or concentrating tables covered by the claims of said patent so construed and applied.

VIII.

And said defendant, answering further, says that it denies all infringement of any exclusive rights secured to the complainant by said patent 590,675 and all profits by it from any such infringement, and all damages to the complainant by reason of any such infringement by it; and it denies all the material allegations of the said bill of complaint not hereinbefore referred to and herein admitted, denied or answered.

All of which defenses this defendant is ready to prove as the Court shall direct, and it prays to be discharged hence with its costs in this behalf incurred.

ARIZONA COPPER COMPANY,
By NORMAN CARMICHAEL,
Vice-President.
M. J. EGAN,
Counsel for Defendant.
[Corporate Seal] N. G. THOMPSON,
Secretary.

[53] R. S. TAYLOR,
E. M. HULSE,
Of Counsel for the Defendant.

[Endorsements]: No. 12 (4). District Court of the Fifth Judicial District of Arizona. The Mine and Smelter Supply Company vs. Arizona Copper Company. Answer. Filed Apr. 4, 1910. Geo. H. Smalley Clerk. Filed March 13, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.

No. 20A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

Amendment to Answer [of Detroit Copper Min. Co.].

The defendant by leave of Court amends its answer as follows:

On page 3 at the end of paragraph V insert the following words, "Saving and excepting, however, from the averments of [54] this paragraph the fact that it has used and is still using a number of ore concentrating tables manufactured by the complainant in this cause and embodying in their construction and operation the invention described and claimed in said patent 590,675, which fact was unknown to counsel for the defendant who drew the answer until after the same had been executed and filed."

On page 3 at the end of paragraph VI, following

the list of United States patents there referred to add the following further United States patents:

290,008, Doyle & Burr, Dec. 11, 1883.
291,872, Brown, Jan. 15, 1884.
336,607, Brown, Feb. 1886.
385,551, Gould, July 3, 1888.
473,644, Schulenburg, Apr. 26, 1892.
519,987, Card, May 15, 1894.

ROBERT S. TAYLOR,
Counsel for Defendant.

We consent that the foregoing amendment may be filed and stand as a part of the answer.

GEO. L. HODGES,
D. EDGAR WILSON,
Counsel for Complainant.

[Endorsements]: No. 11 (5). In Equity. District Court of Arizona. [55] The Mine and Smelter Supply Company vs. Detroit Copper Mining Company of Arizona. Amendment to Answer. Filed May 23, 1910. George H. Smalley, Clerk. By Elsie Patton, Deputy. Filed March 13, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.

No. 21A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

Amendment to Answer [of Arizona Copper Co.].

The defendant by leave of Court amends its answer as follows:

On page 3 at the end of paragraph V insert the following words, "Saving and excepting, however, from the averments of this paragraph the fact that it has used and is still using a number of ore concentrating tables manufactured by the complainant in this cause and embodying in their construction and operation the invention described and claimed in said patent 590,675 [56] which fact was unknown to counsel for the defendant who drew the answer until after the same had been executed and filed."

On page 3 at the end of paragraph VI, following the list of United States patents there referred to, add the following further United States patents:
290,008, Doyle & Burr, Dec. 11, 1883.

291,872, Brown, Jan. 15, 1984.
336,507, Brown, Feb. 16, 1886.
385,551, Gould July 3, 1888.
473,644, Schulenburg, Apr. 26, 1892.
519,987, Card, May 15, 1894.

ROBERT S. TAYLOR,
Counsel for Defendant.

We consent that the foregoing amendment may be filed and stand as part of the answer.

GEORGE L. HODGES,
D. EDGAR WILSON,
Counsel for the Complainant.

[57] [Endorsements]: No. 12 (5) District Court of Arizona. The Mine and Smelter Supply Company vs. Arizona Copper Company. Amendment to Answer. Filed May 23, 1910. George H. Smalley, Clerk. By Elsie Patton, Deputy. Filed March 13, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

[Replication to Answer as Amended of Detroit Copper Min. Co.]

In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.

No. 20A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

REPLICATION OF THE MINE AND SMELTER COMPANY, COMPLAINANT, TO THE ANSWER AS AMENDED OF THE DETROIT COPPER MINING COMPANY OF ARIZONA, DEFENDANT.

[58] This repliant, saving and reserving unto itself, now and at all times hereafter, all and all manner of benefit and advantage of exception which may be had and taken to the manifold errors, uncertainties and insufficiencies of the said answer as amended of the said defendant, for replication thereunto, saith:

That it doth and will aver, maintain and prove its said bill of complaint herein to be true, certain and

sufficient in the law to be amended unto by the said defendant, and that the said answer as amended of the said defendant is very uncertain, untrue, evasive and insufficient in law to be replied unto by this repliant; without this, that any other matter or thing in the said answer as amended contained, material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed or avoided, traversed, or denied, is true; all which matters and things this repliant is ready to aver, maintain and prove as this Honorable Court shall direct, and humbly prays as in and by its said bill of complaint herein it hath already prayed.

Dated this 12th day of July A. D. 1910.

THE MINE AND SMELTER SUPPLY COMPANY,

By FREDERICK S. NAVE,

Solicitor for Complainant.

[59] GEORGE L. HODGES,

D. EDGAR WILSON,

Of Counsel for Complainant.

[Endorsements]: No. 11 (6). In Equity. In the District Court of the Fifth Judicial District of the Territory of Arizona. The Mine and Smelter Supply Company, Complainant, vs. Detroit Copper Mining Company of Arizona, Defendant. Replication. Filed July 12, 1910. George H. Smalley, Clerk. By E. B. Van Veen, Deputy. Filed March 13, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

[Replication to Answer as Amended of Arizona Copper Co.]

In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.

No. 21A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

REPLICATION OF THE MINE AND SMELTER SUPPLY COMPANY, COMPLAINANT, TO THE ANSWER AS AMENDED OF THE ARIZONA COPPER COMPANY, DEFENDANT.

[60] This repliant, saving and reserving unto itself, now and at all times hereafter, all and all manner of benefit and advantage of exception which may be had and taken to the manifold errors, uncertainties and insufficiencies of the said answer as amended of the said defendant, for replication thereunto, saith:

That it doth and will aver, maintain and prove its said bill of complaint herein to be true, certain and sufficient in the law to be answered unto by the said

defendant, and that the said answer as amended of the said defendant is very uncertain, untrue, evasive and insufficient in law to be replied unto by this repliant; without this, that any other matter or thing in the said answer as amended contained, material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed or avoided, traversed or denied, is true; all which matters and things this repliant is ready to aver, maintain and prove as this Honorable Court shall direct, and humbly prays as in and by its said bill of complaint herein it hath already prayed.

Dated this 12th day of July, A. D. 1910.

THE MINE AND SMELTER SUPPLY COMPANY,

By FREDERICK S. NAVE,

Solicitor for Complainant.

GEO. L. HODGES,

D. EDGAR WILSON,

Of Counsel for Complainant.

[Endorsements]: No. 12 (3). In Equity. In the District Court of the [61] Fifth Judicial District of the Territory of Arizona. The Mine and Smelter Supply Company, Complainant, vs. Arizona Copper Company, Defendant. Replication. Filed July 12, 1910. George H. Smalley, Clerk. By E. B. Van Veen, Deputy. Filed March 13, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.

No. 20A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

Stipulation [That Depositions, etc., in Case No. 21A may be Introduced in Case No. 20A, and Admission as to Operation of Mill, etc.].

IT IS HEREBY STIPULATED AND AGREED by and between the parties to the above-entitled cause, by the undersigned, their respective solicitors and of their respective counsel therein, that the depositions, exhibits and stipulations of fact, taken, introduced and entered into in the cause No. 21A, in Equity, pending in this court, wherein the complainant herein, The Mine and Smelter Supply Company is complainant, and Arizona Copper Company is defendant, or true copies and duplicates thereof, and copies of printed abstracts and briefs in said cause, may be introduced, [62] exhibited and considered at the hearing of this cause, the same to

all intents and purposes, and with like effect, as if the same had been regularly taken, introduced and entered into and entitled in this cause; and the defendant herein, by its solicitors and counsel, admit that the mill located at Morenci, Arizona, wherein the complainant's witness, Henry Eggers, testified in said Equity Cause, No. 21A, to having observed in operation Deister ore-concentrating tables, represented by the Complainant's Exhibits Numbered 5, blue-print, and 6, model, introduced in evidence in said cause No. 21A, was, on and prior to January 1st, 1910, and ever since said date has been operated during all of said time the Deister tables referred to in the said testimony of the said witness Eggers, have been in actual use by the said defendant in said mill.

Dated Denver, Colorado, Dec. 13, A. D. 1910.

FREDERICK S. NAVE,
Solicitor for Complainant.
TAYLOR & HULSE,
Solicitors for Defendant.

GEO. L. HODGES,
D. EDGAR WILSON,
Of Counsel for Complainant.

[Endorsements]: No. 11 (7). In Equity. In the District Court of the Fifth Judicial District of the Territory of Arizona. The Mine & Smelter Supply Co., a Corporation, Complainant, vs. Detroit Copper Mining Company of Arizona, a Corporation, Defendant. Stipulation. Filed August 8, 1911. Geo. H. Smalley, Clerk. Filed March 23, 1912. Allan B. Jaynes, Clerk. By W. E. Boggs, Deputy.

[63] Before the proceeding to the taking of depositions of witnesses on behalf of complainant, to maintain the issues in its behalf, the following stipulation was made and entered into in said cause, on September 12, 1910, dated on said day and filed with Almon E. Hart, stenographer and reporter, and a notary public, within and for the City and County of Denver, State of Colorado, who is designated as a Special Examiner in said cause, under the Sixty-seventh rule in Equity, as amended, to be filed in said court in said cause by said Examiner, together with the depositions in behalf of said complainant as Special Examiner.

Stipulation [as to Taking of Depositions, etc.].

IT IS HEREBY STIPULATED AND AGREED by and between the parties to the above-entitled cause, by the undersigned, their respective solicitors and of their respective counsel therein, as follows, to wit:

That the depositions of witnesses on behalf of both complainant and defendant may be taken before Almon E. Hart, stenographer and reporter, and a notary public within and for the City and County of Denver and State of Colorado, and that the said Almon E. Hart is hereby selected and agreed upon to serve and to act as a special examiner [64] in said cause under the sixty-seventh rule in equity, as amended, to take the said testimony within the District and State of Colorado, and to report the same to the said Court, the same and as fully to all in-

tents and purposes as if duly appointed and assigned by order of said Court.

That in case the said Almon E. Hart shall, for any reason, be unable to act, or to proceed with, or to complete the taking of testimony on behalf of either the said complainant or defendant, or in case it shall be desired by counsel for either complainant or defendant respectively, to take testimony in places within the State of Colorado other than in said City and County of Denver, or in places without the said State, and within the United States or its Territories, the depositions of witnesses may be taken before any notary public or other officer authorized by the law of the place where such depositions shall be taken to administer oaths, who may be named and designated by counsel for the party on whose behalf the said depositions are sought to be taken, by notice unless appearance shall be made and notice waived and that the person and the respective persons who shall be so named and designated, or before whom counsel for both parties shall voluntarily appear without notice, [65] is and are hereby selected and agreed upon to serve and to act as special examiner or examiners in said cause, under the sixty-seventh rule in equity, as amended, to take the said testimony on behalf of the party or parties to said cause so designating such person or persons, the same and as fully to all intents and purposes as if duly appointed, assigned and commissioned by order of said Court.

Dated Denver, Colorado, September 12th, A. D. 1910.

FREDERICK S. NAVE,
Solicitor for Complainant.

GEO. L. HODGES,
D. EDGAR WILSON,
Of Counsel for the Complainant.

W. K. FLORA,
E. E. ELLENWOOD,
Solicitors for Defendant.

ROBERT S. TAYLOR,
ELWIN M. HULSE,
Of Counsel for Defendant.

[Proceedings Had Before Special Examiner at Denver, Colorado, in Case No. 21A.]

[66] *In the District Court of the Fifth Judicial District of the Territory of Arizona, Having and Exercising the Same Jurisdiction in All Cases Arising Under the Constitution and Laws of the United States as Vested in the Circuit and District Courts of the United States.*

No. 21A—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,
Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,
Defendant.

BE IT REMEMBERED, that on, to wit, Monday the 12th day of September, in the year of our Lord one thousand nine hundred and ten, in pursuance of the stipulation hereto attached, the parties to the above-entitled cause appeared before me, Almon E. Hart, a notary public within and for the City and County of Denver, Colorado, and Special Examiner in said cause as designated in said stipulation under the 67th Rule in Equity, as amended at the offices of Messrs. Hodges and Wilson, Rooms [67] Nos. 603–607, Ernest and Cranmer Building, in said City of Denver, Colorado; the said complainant appearing by George L. Hodges, Esq., and D. Edgar Wilson, Esq., of Denver, Colorado, and the respondent appearing by E. M. Hulse, Esq., of the firm of Taylor and Hulse, of Fort Wayne, Indiana.

WHEREUPON THE FOLLOWING PROCEEDINGS WERE HAD, to wit:

[Stipulation as to Evidence, Exhibits and Ownership of Letters Patent No. 590,675.]

It was thereupon stipulated by and between the solicitors and counsel for the respective parties that uncertified printed copies of letters patent as furnished by the patent office of the United States and foreign countries might be exhibited and introduced as evidence and used with the same force and effect, both on behalf of complainant and defendant, as duly and regularly certified copies of such letters patent would have.

It was further stipulated that counsel introducing exhibits, models, etc., should have the right to retain

the possession of the same until they are needed for use upon the hearing, subject to the right of either party to examine them at either time.

It was further stipulated and agreed that since about October 12, 1905, the complainant has been and still is the sole and exclusive owner of the patented improvements and inventions covered by United States letters patent numbered 590,675, dated September 28, 1897, issued to Arthur R. Wilfley.

[68] *In the District Court of the United States for the District of Arizona.*

#11 and #12.

THE MINE AND SMELTER SUPPLY COMPANY,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA,

Defendant,

and

THE MINE AND SMELTER SUPPLY COMPANY,

Plaintiff,

vs.

ARIZONA COPPER COMPANY,

Defendant.

Decision by the Court.

The issue made by the pleadings in the above-entitled causes is whether the machine known as the

Deister Concentrator and used by the defendants in their respective mills at Morenci, Arizona, is an infringement of the patent owned by the plaintiff for the machine known as the Wilfley Concentrator, which patent was issued and bears date September 28, 1897. It is not contended that the Deister machine is an infringement of the patent issued for the Wilfley machine except in the construction, adjustment and arrangement upon the table surface of the Deister of riffles of such kind and character and in such a [69] way as to embody the principle and perform the function or functions embodied and performed in the construction, adjustment and arrangement of riffles upon the table surface of the Wilfley machine. It is contended in behalf of the plaintiff that the Wilfley patent embodied a new principle in the art of wet concentration of ore and the machine patented was the first to perform a new and definite function in the practice of ore dressing, so as to produce both increased efficiency and capacity. On the other hand, it is contended in behalf of the defendants that the Wilfley patent was for a narrow and specific improvement in an old art, and therefore to be construed and limited accordingly, and as so construed does not cover any essential feature embodied in the Deister machine.

The evidence bearing upon the issue is voluminous and, in some instances, in sharp conflict. In stating the conclusions I have reached from the consideration of this evidence in the light of the argument and briefs of counsel, I shall not attempt to analyze this evidence, but shall confine myself to a statement of

the conclusions I have reached from my study of the record.

The Wilfley machine may be generally described as a transversely inclined concentrating table, having a number of longitudinal riffles extending a portion of the table's length from the head toward the foot, the riffle at the top being the shortest [70] and the next lower riffle extending a short distance beyond the one above, all forming a series of riffles of unequal length with advancing terminals, each riffle terminating on a smooth part of the table of suitable area, the table being provided with means for feeding the pulp to the upper portion of the table's head and for discharging water along the upper edge of the table so as to subject the material to be concentrated to the washing effect of the water, and, as it is carried across the riffled surface, to the action of gravity as effected by a longitudinally reciprocating movement of a character adapted to move the heavier material containing the mineral in the course of the riffles towards the smooth portion of the table, and the lighter portion carried over the riffles towards that portion of the tail of the table arranged to receive such lighter portions.

The Deister machine differs in shape and size from the Wilfley, but contains the common features as to the method by which the material is carried over the table, and as to the method of utilizing the same combination of agencies or forces, on the washing effect of water flowing by gravity, and the other the vibrating motion automatically controlled by mechanical means. Both tables contain riffles, but on the

Deister table certain of the riffles are proportionately higher than the others, and these higher riffles are placed at regular [71] intervals on the table. On the Wilfley table, all the riffles are of the same height.

The two tables differ in this, that on the Wilfley table the riffles terminate on a relatively smooth portion of the surface of the table, while on the Deister table the riffles have slightly deflected ends, each alternate end being longer than the one above and terminating at an opening into which the separated minerals or concentrates are discharged, and the others terminating on a smooth surface a few inches from the edge of the table. These deflected ends are much lower than the riffle itself, being one thirty-second of an inch in height.

The Wilfley patent is admitted by the defendants to be valid, and therefore the controversy regarding it relates to its scope and the particular device or devices, or combination of devices embraced therein and covered by its terms. Under the familiar rule applied in the construction of patents, in determining the scope of the Wilfley patent we must be guided by the state of the art of concentration of ores prior to and at the date of its issuance. With regard to the particular device or devices protected by the patent, we must look, first, to the machine patented to determine what, if any, feature embodies a new principle or discharges a new [72] function and was, therefore, at the date of the patent, patentable in itself, and, second, to the claim made by the patentee and to the language of the patent as affected by such restrictions or limitations as may appear therein. If,

as contended by the counsel for the defendants, the Wilfley patent was not for an original invention in the sense that it embodied an entirely new principle in the art of wet concentration but the Wilfley was a mere improvement upon tables which at the date of the patent therefor had already been devised by others and known to the art, then, under the well settled rule of construction referred to above, the Deister machine is not to be held to be an infringement on the Wilfley table if it applies the same principle by the use of means and devices which are distinguishable in a mechanical sense from those described in the Wilfley patent.

There can be no doubt but that at the date of the Wilfley patent the general principle of wet concentration of ore by means of automatically vibrated tables having riffles extending transversely across the table, was known, and tables embodying these features had been devised and patents issued therefor. None of these patents, however, appear to have been commercially successful and the Wilfley table is unquestionably the first to apply the general principle in such a way as to make its use so desirable as to supplant or rival other wet [73] concentrating devices operated upon the same or other mechanical principle. It did, undoubtedly, mark a distinct step in the development of the art of concentration by the use of machines combining and employing the two co-ordinating agencies or forces—the flow of water by gravity over a table from its head to its foot, and the lateral vibration imparted to the table by mechanical power automatically applied. The improve-

ment differentiating the Wilfley patent from all others preceding it consisted in the use of riffles having advancing terminals and placed on the table at right angles to the course of the wash-water and ending on a plain or smooth surface. The particular functions of these advancing terminals are in subjecting the partially separated concentrates to repeated washings in their course across the table, and also in automatically maintaining a visual line of separation between the mineral and sands, after separation has been effected, until the former may be discharged from the table. In so far as riffles having advancing terminals is an essential feature on any such table in securing both or either of these results, namely, the resubjecting of concentrates to repeated washings in their course across the table and the maintenance, automatically secured, of the visual line of demarcation between the mineral and sands under varying [74] conditions of feed, such a feature must be considered as covered by the Wilfley patent, and the latter must be regarded as such a distinct improvement in the art of concentration as to be entitled to protection against others securing the same results by equivalent means or devices, unless, perchance, the patentee, Wilfley, in his claim has narrowed the patent to the use of such riffles in combination with a smooth surface.

As I have stated, the Deister table differs in appearance and mechanical arrangement from the Wilfley table in the particular that the riffles terminate with slightly deflected ends having an elevation of but one thirty-second of an inch, each alternate

end being so situated that the concentrates are discharged into openings as the final separation is completed, and each of the others terminating on a smooth surface near the edge of the table. The point of deflection in each riffle is slightly in advance of the one above, so that if the deflected ends were removed, the effect would be to have a table with riffles having advancing terminals as in the Wilfley table.

Two theories are presented by the plaintiff with regard to the use and function of the deflected ends in relation to the other parts of the Deister table. Certain of the expert witnesses who have testified in the case in behalf of [75] the plaintiff, and particularly the witness Hodges, advanced the view that the deflected ends with their low elevation perform essentially the same function as the smooth part of the Wilfley table, and that therefore the Deister table in this immediate respect is undistinguishable in principle and in the means of applying the principle from the Wilfley table. Another view is advanced that the spaces between the ends of the short terminals and the edge of the table are the mechanical equivalent of the smooth or unriffled portion of the Wilfley table, and perform the same function, and hence that the two tables are undistinguishable in principle.

It must be admitted that there are facts tending to support both of these views. It seems, however, to me more probable that neither view is wholly right or wholly wrong; that neither the low deflected ends, nor the spaces between the short ends and the edge of the table, can be said to be the exact equivalent of

the smooth or unriffled area on the Wilfley table, but that both devices combined do take the place and perform the essential function or functions discharged by the smooth or unriffled surface of the Wilfley table.

However, as to that, there is another view of the case which I regard as more reasonable and better supported by the evidence. Whether the points of deflection of the riffles [76] on the Deister table be considered as the real terminals, or the points of termination of the deflected ends be so considered, in either case, as is apparent to the eye, the terminals assume, in general, a diagonal course with regard to the plane of the table, that is, with regard to the general direction of the riffles on the table, in this respect resembling in general the arrangement of the riffles on the Wilfley table; that this diagonal course is an essential feature to the successful working of both tables and discharges the same function on both seems to me to be established by the evidence in the case. There can be no doubt from the evidence adduced that until Wilfley used riffles with advancing terminals, no riffled table had been successfully operated. It appears also that in practically every patent which has been issued since for concentrating tables with riffled surfaces, the arrangement of these riffles has been in general that appearing for the first time in the Wilfley patent; that is to say, the ends from which the concentrates are released from their detention assume a diagonal course across the table. I consider this evidence that the form and arrangement of riffles first applied by Wilfley in his patent and

subsequently in the Deister machine, is important, and perhaps essentially important, to the successful operation of tables of the type to which these belong. I am impressed with [77] the fact that the deflected ends of the riffles on the Deister table do not essentially affect the function discharged by this diagonal arrangement of riffles, and very much doubt if any table of the general type of the Deister and operated upon the same general principle could be successfully operated unless the riffles were arranged upon this plan.

I am, therefore, persuaded that this diagonal arrangement of riffles is as essential a feature in the Deister table as in the Wilfley in the performance of its functions.

It is claimed by the defendants that, conceding that the use of riffles with advancing terminals did constitute a distinct step in the art of concentration, yet the patentee, Wilfley, has limited his invention in this regard to its use in combination with "a smooth or unriffled surface" by associating the two in each instance in which he described his invention and attempted to set forth its function or functions in his application for his patent. The letters patent set forth the claims made by Wilfley in his application, pointing out the "part, improvement or combination" which he claimed as his invention or discovery, as follows:

> "1. A transversely-inclined concentrating-table having a movement whose tendency is to carry the material longitudinally forward toward the tail or foot of the table, said table being

provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length for the purpose specified, the table [78] having a smooth, plain, or unriffled portion extending from the extremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue effected."

"2. A transversely-inclined concentrating-table having a number of longitudinal riffles extending a portion of the table's length from the head toward the foot, said riffles being of unequal length, the uppermost being the shortest while the other riffles increase in length from the upper edge to the lower edge of the table, the table having a plain or unriffled portion lying at the extremities of the riffles and adapted to receive the material caught by the riffles."

"7. The combination of a transversely-inclined concentrating-table having a series of riffles extending longitudinally from the head toward the tail of the table, said riffles being of unequal length, the uppermost being the shortest and the riffles increasing in length from the upper to the lower edge of the table, the table being provided with a plain or unriffled portion of suitable area located at the extremities of the riffles, means for feeding the material to the upper portion of the table's head, means for dis-

charging water on the upper edge of the table, and suitable means for imparting to the table a longitudinally-reciprocating movement of a character adapted to move the material from the head toward the tail of the table."

While the language differs in each one of the specifications quoted, it is quite apparent from a reading of these claims that in the view of the inventor the smooth, plain, or unriffled area of the table constituted an important adjunct to the form and arrangement of riffles described, and discharged a function essential to the successful operation of his device. This is shown by the fact that in each and every [79] instance in which he set forth and described his table, the form and arrangement of riffles is described as being in association with a smooth or unriffled surface. But, assuming that the association of the riffled surface of the table with the smooth or unriffled surface was deemed important or even essential in the view of the inventor, yet if the essential feature of his device, which was new in principle and which in itself constituted a distinct improvement in the art of concentration, may be used in other combinations or with other devices but yet so as to discharge the same or an equivalent function, does the want of foresight in Wilfley in specifying its use in conjunction with such "smooth or unriffled surface" limit the protection afforded by his patent to cases where his arrangement of riffles are similarly combined; that is, with a smooth or unriffled surface, or its mechanical equivalent? To answer this inquiry affirmatively would be to construe the patent as

though it was "for a narrow and specific improvement in an old art," and nothing more than an improvement.

Whether we regard the Wilfley device as a distinct step in the art of wet concentration of ores, it certainly introduced a new principle which was more than a mere improvement on something theretofore known in the art. If an improvement, it was therefore of the kind which, under well-settled [80] rules of construction, is not to be limited strictly to the precise device or arrangement described in his application, but is to be given such a construction as will at least protect the inventor in the use of that feature of his device which is new in principle and which is the essence of his invention, as against others who may use it, or its mechanical equivalent, to produce the same result.

If, therefore, the deflected ends of the riffles on the Deister table, terminating as they do, take the place and perform the same function as the smooth or unriffled portion of the surface of the Wilfley table, or if they perform a new or additional function, yet, if the general arrangement of the riffles on the Deister table is the mechanical equivalent of the advancing terminal arrangement of the riffles on the Wilfley table and this arrangement, as I find to be the case, discharged an essential function in the successful operation of the Deister table as in the Wilfley, then it seems to me that the Wilfley patent, in view of its history and its importance, should be construed, notwithstanding the language used by the inventor in his application, as covering the appropriation by the

Deister table of this essential feature of the Wilfley table and that, therefore, the former is an infringement pro tanto of the Wilfley patent.

[81] In the particular that the arrangement of riffles used on the Desiter table is the equivalent of the advancing terminals on the Wilfley, I hold, therefore, that the Deister table is an infringement upon the Wilfley patent, and that the plaintiff in each of the above-entitled causes is therefore entitled to a judgment and decree of the Court accordingly, and it is so ordered.

RICHARD E. SLOAN,
Judge.

[Endorsements]: No. 11 & No. 12 (11). In the District Court of the United States for the District of Arizona. The Mine and Smelter Supply Company, Plaintiff, vs. Detroit Copper Mining Company of Arizona, Defendant, and The Mine and Smelter Supply Company, Plaintiff, vs. Arizona Copper Company, Defendant. Decision by the Court. Filed January 14, 1913. Allan B. Jaynes, Clerk.

In the District Court of the United States Within and for the District of Arizona.

[82] Nos. 11 and 12.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant,

and

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY,

Defendant.

Petition for Rehearing.

The defendants in said causes respectfully ask the Court to grant a rehearing in the same and in support of this petition submit the following reasons therefor and argument thereon.

(1) The Court erred in the view which it took of the construction and operation of the Deister concentrating table.

(2) The Court erred in the construction which it placed upon the claims in suit for the plaintiff's patent.

(3) The Court erred in sustaining the plaintiff's

contention that the Wilfley patent embodied a new principle in the art of wet concentration of ore and was the first to perform a new and definite function in the practice of ore dressing.

(4) The Court erred in ignoring and giving no effect to patent to Blatchly and Kustel No. 258,879, for ore concentrator dated June 6, 1882, which was in evidence on the part of the defendants.

(5) The Court erred in ignoring and giving no effect to patent to Jacob Lampert, No. 533,362, for concentrator, dated January 29, 1895, which was in evidence on the part of the defendants; whereas the Court should have found that said patent to Lampert constitutes a full defense to the defendants against this suit.

(6) The Court erred in holding that the concentrating table in suit, being the table known as Deister concentrator No. 2, was and is an infringement of claims 1, 2, and 7 of the patent in suit.

(7) The defendants have discovered new evidence material to the issue since the making up and closing of the record in said cause in this, to wit, patent to Jacob Cherney and William C. Davis, for ore concentrator. No. 311,863, dated February 3, 1885, a copy of which is filed herewith.

Wherefore the said defendants pray for a rehearing of said cause, and that upon such rehearing a reargument may be allowed and such further orders may be made therein as justice and the law require.

ROBERT S. TAYLOR,
ELWIN M. HULSE,
Solicitors and of Counsel for the Defendants.

[83] *In the District Court of the United States for the District of Arizona.*

No. 11—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

Decree [in Case No. 11].

THIS CAUSE coming on to be finally heard at the October, A. D. 1912, Term of the said court, upon the pleadings and proofs taken by and on behalf of the respective parties hereto, and being argued by counsel for the respective parties; and the pleadings and proofs, and briefs and arguments of counsel having been taken under advisement, and the Court having duly considered the same and being now fully advised in the premises, it is, on this 14th day of January, A. D. 1913, hereby ORDERED, ADJUDGED, and DECREED as follows, to wit:

FIRST: That the letters patent referred to in the complainant's bill of complaint herein, being letters patent of the United States of America, Numbered 590,675, issued and dated September 28th, A. D. 1897, and granted to Arthur R. Wilfley, for "certain new and useful improvements in ore concentrators," are, in all respects as regards and to the extent of the subject-matter of claims numbered one (1), two (2) and

seven (7) thereof (said first (1st), second (2d) and seventh (7th) claims being the only ones as to which proof of infringement has been offered, and, therefore, the only one considered by the Court) good and valid in law.

SECOND: That the said Arthur R. Wilfley was the true original and first inventor of the improvements described in said [84] United States letters patent No. 590,675, and claimed in said first (1st), second (2d) and seventh (7th) claims thereof.

THIRD: That the Mine and Smelter Supply Company, the complainant in said bill of complaint herein, became, on or about the 12th day of October, A. D. 1905, the sole owner of said United States letters patent No. 590,675, by a good and sufficient assignment in writing from the said Arthur R. Wilfley, duly recorded in the Patent Office of the United States; and that the sole and exclusive title to said letters patent, and all rights thereunder, are vested in the complainant as alleged in the said bill of complaint.

FOURTH: That the said defendant, Detroit Copper Mining Company of Arizona, by the use of certain ore concentrators, or ore concentrating tables, machines or apparatus containing and embodying the invention and improvements set forth, described and claimed in said United States letters patent No. 590,675, aforesaid, as alleged, set forth and shown in the bill of complaint and the proofs adduced herein, and as illustrated and shown by the certain drawings and photographs of the same introduced in evidence as exhibits, as well as by the "Full Size Deister Table

Deck No. 1452" introduced in evidence by the complainant, has infringed, and such ore concentrators, or ore-concentrating tables, machines or apparatus do infringe said [85] United States letters patent No. 590,675 to Arthur R. Wilfley, dated September 28th, A. D. 1897, as to claims numbered one (1), two (2) and seven (7) of the said recited United States letters patent No. 590,675, and thereby the said defendant, Detroit Copper Mining Company of Arizona, has infringed and violated the exclusive rights of the complainant therein and thereunder, to the extent of and in respect to the said first (1st), second (2d) and seventh (7th) claims, and each thereof, of the said letters patent No. 590,675.

FIFTH: AND IT IS FURTHER ORDERED, ADJUDGED AND DECREED that the said defendant, Detroit Copper Mining Company of Arizona, its officers, directors, agents, attorneys, servants, employees, workmen and associates, and every and all persons claiming or holding under or through it, and each and every of them, be, and it and they are hereby perpetually enjoined and restrained from either directly or indirectly making, constructing, using or vending to others to be used, the said ore concentrators, or ore-concentrating tables, machines or apparatus complained of in the said bill of complaint herein, or any ore concentrators, or ore-concentrating tables, machines or apparatus constructed and operated in the manner, or substantially the manner and upon the principles described and illustrated in said letters patent of the United States of America No. 590,675 [86] dated September 28th, A. D. 1897,

and claimed in the first (1st), second (2d) and seventh (7th) claims thereof, or either of them; and specifically from making, using or vending to others to be used, any transversely inclined concentrating table or surface, having a movement imparted thereto the tendency of which is to advance the material being treated upon its surface longitudinally forward from the head or mechanism and toward the foot or concentrate discharge end of such table or surface, said table or surface being provided with a number or plurality of riffles extending longitudinally a portion of the distance from its head end toward its foot end, said riffles varying in length so that the tips or terminals thereof advance one beyond the other continuously and substantially along a line diagonal to the direction of the movement imparted to such table or surface from the upper or feed side to the lower or tailing discharge side thereof, such table or surface having a sufficiently smooth, plain or unriffled surface or area, for the purpose set forth, described and illustrated in the specification, drawings and claims of the said United States letters patent No. 590,675, to Arthur R. Wilfley, located at the extremities of the riffles and adapted to receive the material caught by them as it leaves the riffles, and to subject said material to the side-wash of the wash-water and repeated washings described in the specification of said patent, as the same passes along the said diagonally [87] advancing terminals of such riffles; and from doing any act or thing in infringement of the said first (1st), second (2d) and seventh (7th) claims of the said United States letters patent No. 509,675, or

in violation of the exclusive rights so as aforesaid vested in said complainant therein and thereunder; and it is hereby ORDERED that the writ of permanent and perpetual injunction be issued out of and under the seal of this Court accordingly.

SIXTH: IT IS FURTHER ORDERED, ADJUDGED AND DECREED that the complainant recover of the said defendant, Detroit Copper Mining Company of Arizona, the profits, gains and advantages which the said defendant has received or made, or which have arisen or accrued to it from such infringement, and in violation of complainant's rights, by the use of the improvements in ore concentrators, or ore-concentrating tables, machines or apparatus described in and secured by said United States letters patent No. 590,675, and claimed in claims numbered one (1), two (2) and seven (7) thereof, since the 12th day of January, A. D. 1910; and also that the complainant recover the damages which it has sustained by reason of said infringement from and after said date.

SEVENTH: IT IS FURTHER ORDERED, ADJUDGED AND DECREED that this cause be referred to Ben. M. Crawford, a Master of this court, to ascertain and take, and report to the Court [88] on account of the gains, profits and advantages which the said defendant, Detroit Copper Mining Company of Arizona, has received, or which have arisen or accrued to it since the 12th day of January, A. D. 1910, from infringing the said exclusive rights of the said complainant by the use of the said improvements in ore concentrators, or ore-concentrating tables, de-

scribed and secured by claims numbered one (1), two (2), and seven (7) of the said letters patent No. 590,-675, and to ascertain and report the damages which the said complainant has sustained by said infringement, from the papers and evidence in this cause, and from any evidence which either party may produce before him of the same; and when he shall have had an account of said gains, profits and advantages, and assessed the damages therefor, he shall return the same to this court for further action in the premises.

EIGHTH: IT IS FURTHER ORDERED, ADJUDGED AND DECREED, that the complainant on such accounting have the right to cause an examination of the officers, directors and employees of the said defendant corporation, *ore tenus,* or otherwise, and also the production of the books, vouchers and documents of said defendant corporation, and that the officers, directors and employees of said defendant corporation attend before the said Master from time to time as said Master shall direct.

[89] NINTH: IT IS FURTHER ORDERED that the question of increase of damages and all other matters not herein provided, be reserved until the coming in of the Master's report.

TENTH: IT IS FURTHER ORDERED that the parties and the Master may apply upon due notice to the Court, for such further order or instruction as may be necessary, at the foot of this decree.

ELEVENTH: AND IT IS FURTHER ORDERED, ADJUDGED AND DECREED, that the complainant recover of said defendant, Detroit Copper Mining Company of Arizona, its costs, charges

and disbursements in this suit, to be taxed.

Done in open court at Phoenix, Arizona, this 14th day of January, A. D. 1913.

By the Court:

RICHARD E. SLOAN,
District Judge.

The foregoing form of decree is assented to by the defendant.

TAYLOR and HULSE,
Solicitors of Counsel for the Defendant.

[Endorsements]: No. 11 (13). In Equity. In the U. S. District Court for the District of Arizona. The Mine and Smelter Supply Company, Complainant, vs. Detroit Copper Mining Company of Arizona, [90] Defendant. Decree. Filed March 6, 1913, at 2:00 P. M. Allan B. Jaynes, Clerk.

[Decree in Case No. 12.]

In the District Court of the United States Within and for the District of Arizona.

No. 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,
Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,
Defendant.

THIS CAUSE coming on to be finally heard at the October, A. D. 1912 Term of the said Court, upon the pleadings and proofs taken by and on be-

half of the respective parties hereto, and being argued by counsel for the respective parties; and the pleadings and proofs, and briefs and arguments of counsel having been taken under advisement, and the Court having duly considered the same and being now fully advised in the premises, it is on this 14th day of January, A. D. 1913, hereby ORDERED, ADJUDGED and DECREED as follows, to wit:

FIRST: That the letters patent referred to in the complainant's bill of complaint herein, being letters patent of the **[91]** United States of America, Numbered 590,675, issued and dated September 28th, A. D. 1897, and granted to Arthur R. Wilfley, for "certain new and useful improvements in ore concentrators," are, in all respects as regards and to the extent of the subject-matter of claims numbered (1), two (2) and seven (7) thereof (said first (1st), second (2nd) and seventh (7th) claims being the only ones as to which proof of infringement has been offered, and, therefore, the only ones considered by the Court) good and valid in law.

SECOND: That said Arthur R. Wilfley was the true original and first inventor of the improvements described in said United States letters patent No. 590,675, and claimed in said first (1st), second (2nd) and seventh (7th) claims thereof.

THIRD: That the Mine and Smelter Supply Company, the complainant in said bill of complaint therein, became, on or about the 12th day of October, A. D. 1905, the sole owner of said United States letters patent No. 590,675, by a good and sufficient assignment in writing from the said

Arthur R. Wilfley, duly recorded in the Patent Office of the United States; and that the sole and exclusive title to said letters patent, and all rights thereunder, are vested in the complainant as alleged in the said bill of complaint.

FOURTH: That the said defendant, Arizona Copper Company, **[92]** by the use of certain ore concentrators, or ore-concentrating tables, machines or apparatus containing and embodying the invention and improvements set forth, described and claimed in said United States letters patent No. 590,675 aforesaid, as alleged, set forth and shown in the bill of complaint and the proofs adduced herein, and as illustrated and shown by the certain drawings and photographs of the same introduced in evidence as exhibits, as well as by the "Full Size Deister Table Deck No. 1452" introduced in evidence by the complainant, has infringed, and such ore concentrators, or ore-concentrating tables, machines or apparatus do infringe said United States letters patent No. 590,675 to Arthur R. Wilfley, dated September 28th, A. D. 1897, as to claims numbered one (1), two (2) and seven (7) of the said recited United States letters patent No. 590,-675, and thereby the said defendant, Arizona Copper Company, has infringed and violated the exclusive rights of the complainant therein and thereunder, to the extent of and in respect to the said first (1st), second (2nd) and seventh (7th) claims, and each thereof, of the said letters patent No. 590,675.

FIFTH: AND IT IS FURTHER ORDERED, ADJUDGED AND DECREED, that the defendant, Arizona Copper Company, its officers, directors, agents, attorneys, servants, employees, workmen and associates, and every and all persons claiming or holding under or through it, and each and every of them, be, and it and they **[93]** are hereby perpetually enjoined and restrained from either directly or indirectly making, constructing, using or vending to others to be used, the said ore concentrators, or ore-concentrating tables, machines or apparatus complained of in the said bill of complaint herein, or any ore concentrators, or ore-concentrating tables, machines or apparatus constructed and operated in the manner, or substantially the manner and upon the principles described and illustrated in said letters patent of the United States of America No. 590,675, dated September 28th, A. D. 1897, and claimed in the first (1st), second (2nd) and seventh (7th) claims thereof, or either of them; and specifically from making, using or vending to others to be used, any transversely inclined concentrating table or surface, having a movement imparted thereto the tendency of which is to advance the material being treated upon its surface longitudinally forward from the head or mechanism end toward the foot or concentrate discharge end of such table or surface, said table or surface being provided with a number or plurality of riffles extending longitudinally a portion of the distance from its head end towards its foot end, said riffles varying in length so that the tips or terminals

thereof advance one beyond the other continuously and substantially along a line diagonal to the direction of the movement imparted to such table or surface from the upper or feed **[94]** side to the lower or tailing discharge side thereof, such table or surface having a sufficiently smooth, plain or unriffled surface or area, for the purpose set forth, described and illustrated in the specification, drawings and claims of the said United States letters patent No. 590,675 to Arthur R. Wilfley, located at the extremities of the riffles and adapted to receive the material caught by them as it leaves the riffles, and to subject said material to the side-wash of the wash-water and repeated washings described in the specification of said patent, as the same passes along the said diagonally advancing terminals of such riffles; and from doing any act or thing in infringement of the said first (1st), second (2nd) and seventh (7th) claims of the said United States letters patent No. 590,675, or in violation of the exclusive rights so as aforesaid vested in said complainant therein and thereunder; and it is hereby ORDERED that the writ of permanent and perpetual injunction be issued out of and under the seal of this Court accordingly.

SIXTH: IT IS FURTHER ORDERED, ADJUDGED AND DECREED that the complainant recover of the said defendant, Arizona Copper Company, the profits, gains and advantages which the said defendant has received or made, or which have arisen or accrued to it from such infringement, and in violation *or* complainant's rights, by the use of

the improvements in ore concentrators, or [95] ore-concentrating tables, machines or apparatus described in and secured by said United States letters patent No. 590,675, and claimed in claims numbered one (1), two (2) and seven (7) thereof, since the 12th day of January, A. D. 1910; and also that the complainant recover the damages which it has sustained by reason of said infringement from and after said date.

SEVENTH: IT IS FURTHER ORDERED, ADJUDGED AND DECREED, that this cause be referred to Ben M. Crawford, a Master of this Court, to ascertain and take and report to the Court an account of the gains, profits and advantages which the said defendant, Arizona Copper Company, has received, or which have arisen or accrued to it since the 12th day of January, A. D. 1910, from infringing the said exclusive rights of the said complainant by the use of the said improvements in ore concentrators, or ore-concentrating tables, described and secured by claims numbered one (1), two (2) and seven (7) of the said letters patent No. 590,675, and to ascertain and report the damages which the said complainant has sustained by said infringement, from the papers and evidence in this cause, and from any evidence which either party may produce before him of the same; and when he shall have had an account of said gains, profits and advantages, and assessed the damages therefor, he shall return the same to this Court for further action in the premises.

[96] EIGHTH: IT IS FURTHER ORDERED, ADJUDGED AND DECREED that the complainant on such accounting have the right to cause an examination of the officers, directors and employees of the said defendant corporation, *ore tenus* or otherwise, and also the production of the books, vouchers and documents of said defendant corporation, and that the officers, directors and employees of said defendant corporation attend before the said Master from time to time as said Master shall direct.

NINTH: IT IS FURTHER ORDERED that the question of increase of damages and all other matters not herein provided, be reserved until the coming in of the Master's report.

TENTH: IT IS FURTHER ORDERED that the parties and the Master may apply upon due notice to the Court, for such further order or instruction as may be necessary, at the foot of this decree.

ELEVENTH: AND IT IS FURTHER ORDERED, ADJUDGED, AND DECREED that the complainant recover of said defendant, Arizona Copper Company, its costs, charges and disbursements in this suit, to be taxed.

DONE in open Court at Phoenix, Arizona, this 14th day of January, A. D. 1913.

By the Court:

RICHARD E. SLOAN,
District Judge.

[97] We consent to the foregoing form of entry in said cause.

TAYLOR and HULSE,
Solicitor and of Counsel for the Defendant.

[Endorsements]: No. 12 (18). In Equity. In the United States District Court for the District of Arizona. The Mine and Smelter Supply Company, Complainant, vs. Arizona Copper Company, Defendant. Decree. Filed March 6, 1913, at 2:00 P. M. Allan B. Jaynes, Clerk.

In the District Court of the United States Within and for the District of Arizona.

No. 11—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

Notice of Application to Tax Costs [in Case No. 11].

To the Defendant in the Above-entitled Cause, and Messrs. Taylor and Hulse, its Solicitors and Counsel Therein:

YOU WILL PLEASE TAKE NOTICE that on ———, the ——— day of ————, A. D. 1913, at the hour of ——— o'clock A. M., or as soon thereafter as counsel can be heard, counsel for the complainant in the above-entitled cause will [98] present and file with the Clerk of said United States District Court, at the courtroom of said Court in the city of Phoenix, County of Maricopa, State of Arizona, a memorandum of costs and disbursements

necessarily incurred by said complainant in the above-entitled action, and shall then and there make application for the taxation of the same as costs in said action against the said defendant; when and where you may attend and be heard, if you so desire.

A copy of the said memorandum of costs and necessary disbursements so to be presented and filed as aforesaid, supported by the affidavit of George L. Hodges, Esq., one of counsel for complainant, is herewith delivered to you.

Dated at Denver, Colorado, this 17th day of February, A. D. 1913.

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors and Counsel for Complainant.

SERVICE of the above and foregoing Notice of Application to Tax Costs, together with a copy of Complainant's Memorandum of Costs and Necessary Disbursements therein referred to, by receipt of true copies thereof at Fort Wayne, Indiana, on this 21st day of February, A. D. 1913, at the hour of 2 o'clock P. M., is hereby acknowledged.

TAYLOR and HULSE,
_____,
Solicitors and Counsel for Defendant.

[99] [Endorsements]: No. 11 (14). In Equity. In the U. S. District Court for the District of Arizona. The Mine and Smelter Supply Company, Complainant, vs. Detroit Copper Mining Company of Arizona, Defendant. Notice of Application to Tax Costs. Filed March 6, 1913. Allan B. Jaynes, Clerk.

In the United States District Court Within and for the District of Arizona.

No. 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

Notice of Application to Tax Costs [in Case No. 12].

To the Defendant in the above-entitled cause, and Messrs. Taylor and Hulse, its Solicitors and Counsel Therein:

YOU WILL PLEASE TAKE NOTICE that on ———, the ——— day of ————, A. D. 1913, at the hour of ——— o'clock, or as soon thereafter as counsel can be heard, counsel for the complainant in the above-entitled cause will present and file with the Clerk of said United States District Court, at the [100] courtroom of said Court in the City of Phoenix, County of Maricopa, State of Arizona, a memorandum of costs and disbursements necessarily incurred by said complainant in the above-entitled action, and shall then and there make application for the taxation of the same as costs in said action against the said defendant; when and where you may attend and be heard if you so desire.

A copy of the said memorandum of costs and necessary disbursements so to be presented and filed as aforesaid, supported by the affidavit of George L.

Hodges, Esq., one of counsel for complainant, is herewith delivered to you.

Dated at Denver, Colorado, this 17th day of February, A. D. 1913.

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors and Counsel for Complainant.

SERVICE of the above and foregoing Notice of Application to Tax Costs, together with a copy of Complainant's Memorandum of Costs and Necessary Disbursements therein referred to, by receipt of true copies thereof at Fort Wayne, Indiana, on this 21st day of February, A. D. 1913, at the hour of 2 o'clock P. M., is hereby acknowledged.

TAYLOR and HULSE,
_____,
Solicitors and Counsel for Defendant.

[101] [Endorsements]: No. 12. (19.) In Equity. In the U. S. District Court for the District of Arizona. The Mine and Smelter Supply Company, Complainant, vs. Arizona Copper Company, Defendant. Notice of Application to Tax Costs. Filed March 6, 1913. Allan B. Jaynes, Clerk.

[Memorandum of Costs and Disbursements in Case No. 11.]

In the District Court of the United States Within and for the District of Arizona.

No. 11—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

Memorandum of Costs and Necessary Disbursements of the Complainant in the Above-entitled Cause, and Application for the Taxation of Same as Costs Herein Against the Defendant, Together With Affidavit in Support Thereof.

Comes now the complainant in the above-entitled cause, by George L. Hodges and D. Edgar Wilson, its solicitors and counsel herein, and presents its Memorandum of Costs and Necessary Disbursements incurred in the above-entitled action, as hereinafter set forth, and hereby makes application for the taxation of the [102] same as costs herein against the said defendant, to wit:

To fee for attendance at trial.....$20.00

To costs for each pleading filed:

Bill for Complaint..... 3.00

Replication..... 3.00

To U. S. Marshal's fees..... 39.15

Together with such Clerk's costs charged to complainant and properly taxable herein $30.00 deposited by complainant..... 31.38

Total.....$95.53

The total amount claimed by the complainant herein for costs, exclusive of the Clerk's costs to be taxed, being the sum of Sixty-five Dollars and Fifteen Cents ($65.15).

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors and Counsel for Complainant.

State of Colorado,
City and County of Denver,—ss.

George L. Hodges, being first duly sworn, upon his oath deposes and says: That he is one of counsel for the Complainant in the above-entitled action; that he has read the above and foregoing memorandum of costs and [103] necessary disbursements of the complainant in the above-entitled cause, and is familiar therewith, and knows that the items thereof are correct and that the disbursements therein mentioned have been necessarily incurred in the said action or proceeding on behalf of the said complainant.

GEORGE L. HODGES.

Subscribed and sworn to before me, this 17th day of February, A. D. 1913.

My Commission expires April 16th, 1916.

[Seal] DARWIN T. MASON,
Notary Public.

[Endorsements]: No. 11. (15.) In Equity. In the United States District Court for the District of

Arizona. The Mine and Smelter Supply Company, Complainant, vs. Detroit Copper Mining Company of Arizona, Defendant. Memorandum of Costs of Complainant and Application to Tax Same. Filed March 6, 1913. Allan B. Jaynes, Clerk.

[Memorandum of Costs and Disbursements in Case No. 12.]

In the District Court of the United States Within and for the District of Arizona.

No. 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

[104] MEMORANDUM OF COSTS AND NECESSARY DISBURSEMENTS OF THE COMPLAINANT IN THE ABOVE-ENTITLED CAUSE, AND APPLICATION FOR THE TAXATION OF SAME AS COSTS HEREIN AGAINST THE DEFENDANT, TOGETHER WITH AFFIDAVIT IN SUPPORT THEREOF.

Comes now the complainant in the above-entitled cause, by George L. Hodges and D. Edgar Wilson, its solicitors and counsel herein, and presents its Memorandum of Costs and Necessary Disbursements incurred in the above-entitled action, as hereinafter set forth, and hereby makes application for the taxation

of the same as costs herein against the said defendant, to wit:

To fee for attendance at trial.....$ 20.00
To costs for each pleading filed:
Bill of Complaint..... 3.00
Replication..... 3.00
To attorneys' fee for each deposition taken on behalf of complainant:
Walter H. Bunce..... 2.50
John M. Callow..... 2.50

Amount to forward.....$ 31.00
To amount forwarded.....$ 31.00
To attorneys' fee for each deposition (continued):
Henry Eggers, two depositions..... 5.00
Clarence I. Glassbrook..... 2.50
Vernon E. Hodges, two depositions....$ 5.00
[105] Robert H. Richards, three depositions..... 7.50
Jesse C. Scobey..... 2.50
Charles E. Thompson..... 2.50
Arthur R. Wilfley..... 2.50
To witness fees for each witness produced and examined on behalf of complainant, at $1.50 per diem:
Walter H. Bunce, 1 day..... 1.50
John M. Callow, 1 day..... 1.50
Henry Eggers, 3 days..... 4.50
Clarence I. Glassbrook, 3 days..... 4.50
Vernon E. Hodges, 6 days..... 9.00
Robert H. Richards, 7 days..... 10.50

Jesse C. Scobey, 3 days.....	4.50
Charles E. Thompson, 1 day.....	1.50
Arthur R. Wilfley, 2 days.....	3.00
To fees of Special Examiners taking depositions of witnesses on behalf of complainant at the rate of $5.00 per diem:	
Special Examiner John D. Yoakley, 5 days	25.00
Special Examiner Almon E. Hart, 15 days.....	75.00
To fees for depositions of witnesses taken as aforesaid:	
Amount to forward.....$199.00	
[106] To amount forwarded...$199.00	
Before Special Examiner John D. Yoakley, 330 folios at 20 cents per folio..	66.00
Before Special Examiner Almon E. Hart, 1011 folios, at 20¢ per folio...	202.20
John D. Yoakley, swearing and certificate to 1 witness at .75¢.....	.75
Almon E. Hart, swearing and certificates to 12 witnesses and depositions at .75¢.....	9.00
To Marshal's fees....	32.08
Together with such Clerk's costs charged to complainant and properly taxable herein, $30.00 deposited by complainant.....	25.46

The total amount claimed by the complainant herein for costs, exclusive of the Clerk's costs to be taxed,

being the sum of five hundred and nine dollars and three cents.....(\$509.03)

Clerk..... 25.46

Total....\$534.49

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors and Counsel for Complainant.

[107] State of Colorado,
City and County of Denver,—ss.

George L. Hodges, being first duly sworn, upon his oath deposes and says: That he is one of counsel for the complainant in the above-entitled action; that he has read the above and foregoing memorandum of costs and necessary disbursements of the complainant in the above-entitled cause, and is familiar therewith, and knows that the items thereof are correct, and that the disbursements therein mentioned have been necessarily incurred in the said action or proceeding on behalf of the said complainant.

GEORGE L. HODGES.

Subscribed and sworn to before me this 17th day of February, A. D. 1913.

My commission expires April 16th, 1916.

[Seal] DARWIN T. MASON,
Notary Public.

In response to the objection of counsel for defendant to allowance of \$5.00 per diem to Special Examiners, we submit that these Special Examiners were authorized, pursuant to stipulation entered into between counsel (See Stipulation on page 17, Com-

plainant's Printed Record), to act the same and as fully to all intents and purposes as if duly appointed and commissioned by the Court, etc. By agreement off the record each side was to [108] pay one-half of a $10.00 per diem to the special examiners, which complainant did, and which was part of complainant's costs in taking the depositions. We believe we are entitled to taxation accordingly, and also under the rules and usual practice.

HODGES & WILSON,
Solicitors and Counsel for Complainant.

Denver, Colorado, March 3, 1913.

We object to the allowance to Special Examiners, John D. Yoakley and Almon E. Hart, of $5.00 per diem, and in addition thereto of $286.20 for taking the testimony. We know of no statute authorizing it.

TAYLOR & HULSE,
Solicitors and Counsel for the Arizona Copper Company.

Ft. Wayne, Indiana, Feb. 28, 1913.

[Endorsements]: No. 12 (20). In Equity. In the U. S. District Court for the District of Arizona. The Mine and Smelter Supply Company, Complainant, vs. Arizona Copper Company, Defendant. Memorandum of Costs of Complainant and Application to Tax Same. Filed March 6, 1913. Allan B. Jaynes, Clerk.

[109] *In the District Court of the United States Within and for the District of Arizona.*

No. 11—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

Prayer for Appeal and Assignment of Errors [of Detroit Copper Min. Co.].

The said defendant, the Detroit Copper Mining Company of Arizona, a corporation, feeling aggrieved by the decision pronounced by said Court in said cause in favor of the plaintiff therein, prays an appeal therefrom to the United States Circuit Court of Appeals for the Ninth Circuit and asks the Court to grant the said appeal and fix the amount of bond to be given by said defendant on such appeal. Said defendant further prays determination of said appeal.

And as ground for said appeal the said defendant assigns the following errors in the judgment and proceedings of said Court:

1. The Court erred in holding that the Deister Concentrating Table No. 2, the machine which was the subject of the litigation, was an infringement of the patent in suit.

[110] The Court erred in holding that the low and

diagonally deflected riffles on the said Deister Concentrator No. 2 were an essential feature of said Deister Concentrator.

3. The Court erred in holding that the diagonal deflection of the ends of the riffles on the Deister Concentrator was the mechanical equivalent of the advancing terminal arrangement of the riffles on the Wilfley table.

4. The Court erred in its construction of the claims of the Wilfley patent in suit.

5. The Court erred in holding that it was a want of foresight in Wilfley to limit his claims as he did.

6. The Court erred in holding that in view of the history and importance of the Wilfley patent in suit it should be construed notwithstanding the language used by the inventor as covering the appropriation of this essential feature of the Wilfley table.

7. The Court erred in denying the defendant's petition for rehearing.

8. The Court erred in rendering judgment for the plaintiff.

ROBERT S. TAYLOR,
ELWIN M. HULSE,
Solicitors for Defendant.

[111] [Endorsements]: No. 11. In Equity. Mine and Smelter Supply Company vs. Detroit Copper Mining Company of Arizona. Prayer for Appeal and Assignment of Errors. Filed May 10, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

[Petition of Arizona Copper Co. for Allowance of Appeal.]

In the District Court of the United States, Within and for the District of Arizona.

No. 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

The said defendant, the Arizona Copper Company, a corporation, feeling aggrieved by the decision pronounced by said court in said cause in favor of the plaintiff therein, prays an appeal therefrom to the United States Circuit Court of Appeals for the Ninth Circuit, and asks the Court to allow the said appeal and fix the amount of bond to be given by said defendant on such appeal. Said defendant further prays the Court to stay all proceedings under said judgment until the determination of said appeal.

[Assignment of Errors by Arizona Copper Co.]

[112] And as ground for said appeal the said defendant assigns the following errors in the judgment and proceedings of said court:

1. The Court erred in holding that the Deister Concentrating Table No. 2, the machine which was the subject of the litigation was an infringement of the patent in suit.

2. The Court erred in holding that the low and

diagonally deflected riffles on the said Deister Concentrator No. 2 were an essential feature of said Deister Concentrator.

3. The Court erred in holding that the diagonal deflection of the ends of the riffles on the Deister concentrator was the mechanical equivalent of the advancing terminal arrangement of the riffles on the Wilfley table.

4. The Court erred in its construction of the claims of the Wilfley patent in suit.

5. The Court erred in holding that it was a want of foresight in Wilfley to limit his claim as he did.

6. The Court erred in holding that in view of the history and importance of the Wilfley patent in suit it should be construed notwithstanding the language used by the inventor as covering the appropriation of this essential feature of the Wilfley table.

7. The Court erred in denying the defendant's petition for rehearing.

8. The Court erred in rendering judgment for the plaintiff.

[113] ROBERT S. TAYLOR,
EDWIN M. HULSE,
Solicitors for Defendant.

[Endorsement]: No. 12. In Equity. Mine and Smelter Supply Company vs. Arizona Copper Company. Petition for Appeal. Filed May 10, 1913. Allan B. Jaynes, Clerk.

[Motion in Case No. 11 for Extension of Time to Prepare Transcript, etc.]

[114] *In the District Court of the United States for the District of Arizona.*

No. 11—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

The above-named defendant, the Detroit Copper Mining Company of Arizona, represents to the Court that it has taken an appeal from the decision of this court to the United States Circuit Court of Appeals for the Ninth Circuit, as appears on the record; that in obedience to paragraph (b) of rule 75 of the new rules in equity, this defendant as appellant is required to set forth in simple and condensed form all the evidence in said record, which is a duty imposing upon the defendant's counsel a great labor requiring much time, the record of the evidence in this case occupying 429 large printed pages; that its counsel has been engaged with all possible diligence upon that work, and is expecting now to have the record of said cause in the condensed form required by the rule finished and lodged in the clerk's office about June 4th, 1913, after which the plaintiff will be entitled to a hearing upon the subject of the state-

ment submitted [115] by the defendant; that this unavoidable delay will make it impossible for the clerk to prepare a transcript within thirty days from the day of signing the citation in said cause, as required by the rules of this court. Wherefore, said defendant prays the Court to grant an extension of forty days time, if it should be required, for the clerk to comply with the rule of this court.

DETROIT COPPER MINING COMPANY OF ARIZONA.

By R. S. TAYLOR,
E. M. HULSE,
Its Solicitors.

In the District Court of the United States for the District of Arizona.

No. 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

Motion [in Case No. 12] for Extension of Time to Clerk for Filing Transcript.

And now comes the Arizona Copper Company, defendant in said cause, and shows to the Court that it, too, has taken an [116] appeal from the decision of this court to the United States Circuit Court of Appeals for the Ninth Circuit, as appears by the record, and that all the foregoing facts stated by the

Detroit Copper Mining Company of Arizona apply to this case; that the two cases are by the same plaintiff and for infringement of the same claims of the same patent by the use of the same thing; that by agreement of counsel during the progress of said cause only one record was made up, which was to apply to both cases alike; wherefore, the said defendant prays that the same order may be made to apply to both cases alike.

ARIZONA COPPER COMPANY.
By R. S. TAYLOR,
E. M. HULSE,
Its Solicitors.

[Endorsements]: #11 and #12. In Equity. Motion for Extension of Time to Clerk for Filing Transcript. Mine and Smelter Supply Company vs. Detroit Copper Mining Company and Mine and Smelter Supply Company vs. Arizona Copper Company. Filed May 31, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

In the United States Circuit Court of Appeals for the Ninth Circuit.

[117] No. 11.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,
Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,
Appellee.

Order Extending Time to [July 3, 1913, to] File Record on Appeal [in Case No. 11] and to Docket Cause.

On motion of R. S. Taylor and E. M. Hulse, Esqs., solicitors for the Detroit Copper Mining Company of Arizona, a corporation, the above-named appellant, and good cause appearing therefor, it is

ORDERED, that the appellant have to and including the 3d day of July, 1913, within which to docket the cause and to file the record on appeal in the United States Circuit Court of Appeals for the Ninth Circuit.

Dated June 4th, 1913.

WM. W. MORROW,
United States Circuit Judge for the Ninth Circuit.

[Endorsements]: Detroit Copper Mining Company *Company*, Appellant, vs. Mine and Smelter Supply Company. Order Continued Time to Perfect Appeal. Filed June 6, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy. United States District Court for the District of Arizona.

[Order Extending Time to July 3, 1913, to Docket Cause and to File Record in Case No. 12 in Appellate Court.]

[118] *In the United States Circuit Court of Appeals for the Ninth Circuit.*

No. 12.

ARIZONA COPPER COMPANY, a Corporation, Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Appellee.

ORDER TO CONTINUE TIME TO PERFECT APPEAL.

On motion of R. S. Taylor and E. M. Hulse, Esqs., solicitors for the Arizona Copper Company, a corporation, the above-named appellant, and good cause appearing therefor, it is

ORDERED, that the appellant have to and including the 3d day of July, 1913, within which to docket the cause and to file the record on appeal in the United States Circuit Court of Appeals for the Ninth Circuit.

Dated June 4th, 1913.

WM. W. MORROW,

United States Circuit Judge for the Ninth Circuit.

[Endorsements]: No. 12. United States District Court, District of Arizona. Arizona Copper Company, Appellant, vs. Mine and Smelter Supply [119] Company. Order to Continue Time to Perfect Appeal. Filed June 6, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

[Stipulation for Transmission of Original Exhibits to Appellate Court.]

In the District Court of the United States for the District of Arizona.

#11 and#12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant,

and

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

APPEAL TO THE UNITED STATES CIRCUIT COURT OF APPEALS.

It is stipulated and agreed by counsel in said appeal that the printed volume on file entitled "Book of Complainant's Paper Exhibits, Drawings and Photographs" shall be transmitted by the clerk with the transcript to the United States Circuit Court of [120] Appeals for the Ninth Circuit as an exhibit, and that the Clerk shall also transmit with the record

such other exhibits as the parties may request.

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors for Appellee.
ROBERT S. TAYLOR,
E. M. HULSE,
Solicitors for Appellant.

[Endorsements]: #11 and #12, in Equity. Mine and Smelter Supply Company vs. Detroit Copper Mining Company and Arizona Copper Company. Stipulation as to Exhibits. Filed June 9, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

In the United States District Court for the District of Arizona.

#11 and #12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant,

and

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

Stipulation [That Clerk Transmit to Appellate Court One Transcript of Record Covering Cases Nos. 11 and 12, and That the Cases be Submitted Together as One Case].

[121] Whereas the above-named cases were brought by the same plaintiff in the same court for alleged infringement of the same claims of the same patent by use of the same thing, and by agreement of counsel all the testimony taken was applied in both cases alike, so that there is in existence only one record of the proceedings, and

Whereas each of said defendants has appealed from the judgment of said court against it to the United States Circuit Court of Appeals for the Ninth Circuit,—

It is therefore agreed and stipulated by counsel for the parties respectively that the Clerk shall prepare and transmit to the Clerk of the United States Circuit Court of Appeals one transcript of the record entitled in both of said cases and that they shall be submitted and argued in said Court of Appeals together as one case subject to any direction which the Court shall give in reference thereto.

GEORGE L. HODGES,
D. EDGAR WILSON,
For the Plaintiff.
R. S. TAYLOR,
E. M. HULSE,
For the Defendant.

[Endorsements]: #11 and #12, in Equity. Mine and Smelter Supply Company [122] vs. Detroit

Copper Mining Company and Arizona Copper Company. Stipulation. Filed June 9, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

No. 11.

THE MINE & SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY, a Corporation,

Defendant.

Transcript of the Minute Entries [in Case No. 11].

BE IT REMEMBERED, that heretofore and upon, to wit, the 7th day of October, A. D. 1912, the same being one of the regular juridical days of the October, 1912 Term of said court, the following order, *inter alia,* was had and entered of record in said court in said cause, which said order is in words and figures as follows, to wit:

[Order Setting Case for Trial in Case No. 11.]

11.

MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

It is ordered that this case be set for trial on Monday, November 18, 1912, at 10:00 o'clock A. M.

AND AFTERWARDS, and upon, to wit, the 18th day of November, A. D. 1912, the same being one of the regular juridical days of the October, 1912, Term of said court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures, as follows, to wit:

[Trial in Case No. 11.]

[123] 11.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

THE DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

This case came on this day regularly for hearing upon the report of the Master herein, George L. Hodges, Esquire, appearing as counsel for the plaintiff and E. M. Hulse, Esquire, for the defendant. It is hereby stipulated between counsel for the respective counsel in this case that the testimony taken in the case of The Mine and Smelter Supply Company, a Corporation, Plaintiff, vs. The Arizona Copper Mining Company, a Corporation, Defendant, No. 12 in this court, shall be considered as having been taken in this case. Argument of the respective counsel was had and the further trial was ordered continued until Tuesday, November 19, 1912, at 9:30 o'clock A. M.

AND AFTERWARDS, and upon, to wit, the 19th day of November, A. D. 1912, the same being one of

the regular juridical days of the November, 1912, Term of said court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Trial (Resumed) in Case No. 11.]

11.

MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

THE DETROIT COPPER MINING COMPANY, a Corporation,

Defendant.

This case having been continued from yesterday's session of this court, come now the same parties hereto, and the [124] further trial of the case proceeds as follows: Further argument of the respective counsel was had and the case being now fully submitted to the Court, the same was by the Court taken under advisement.

AND AFTERWARDS, and upon, to wit, the 14th day of January, A. D. 1913, the same being one of the regular juridical days of October, 1913, Term of said court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Order in Case No. 12 That Judgment be Entered.]

12.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

THE ARIZONA COPPER COMPANY, a Corporation,

Defendant.

This case having been argued and fully submitted at a previous session of this court, and the Court now being fully advised in the premises orders that judgment be entered herein in favor of the plaintiff in accordance with the opinion signed and filed herein.

AND AFTERWARDS, and upon, to wit, the 7th day of April, A. D. 1913, the same being one of the regular juridical days of the April, 1913, Term of said court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Order of Submission of Motion for Rehearing [in Case No. 11.]

[125] 11.

MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

THE DETROIT COPPER MINING COMPANY, a Corporation,

Defendant.

It is ordered by the Court that the motion of the defendant for a rehearing herein be submitted upon the briefs on file herein.

AND AFTERWARDS, and upon, to wit, the 14th day of April, A. D. 1913, the same being one of the regular juridical days of the April, 1913, Term of said court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Order Denying Petition for Rehearing in Case No. 11.]

11.

MINE AND SMELTER SUPPLY COMPANY,
a Corporation,

Plaintiff,

vs.

THE DETROIT COPPER MINING COMPANY,
a Corporation,

Defendant.

The petition of the defendant for a rehearing herein having been heretofore fully submitted to the Court, and the Court being fully advised in the premises, does deny said petition.

AND AFTERWARDS, and upon, to wit, the 9th day of May, A. D. 1913, the same being one of the regular juridical days of the April, 1913, Term of said court, the following order, *inter alia,* was had and entered of record [125a] in said court, in said cause, which said order is in words and figures as follows, to wit:

[Order Allowing Appeal, etc., in Case No. 11.]

11.

MINE AND SMELTER SUPPLY COMPANY,
a Corporation,

Plaintiff,

vs.

THE DETROIT COPPER MINING COMPANY,
a Corporation,

Defendant.

Comes now the defendant and prays an appeal to the United States Circuit Court of Appeals for the Ninth Circuit from the judgment rendered against it on the 14th day of January, 1913, and shows to the Court that it has paid into the hands of the clerk of this court one Thousand Five Hundred Dollars in money, to stand as security in lieu of bond on such appeal. And it is ordered by the Court that said appeal be allowed and said deposit of money accepted in lieu of bond as security to be forfeited to the plaintiff, or so much thereof as shall be necessary for its indemnity, if the defendant shall fail to make good its plea on such appeal. And it is ordered, further, that the clerk deposit said sum of One Thousand Five Hundred Dollars so paid to him in the registry of the court until the further order of the Court.

AND AFTERWARDS, and upon, to wit, the 10th day of May, A. D. 1913, the same being one of the regular juridical days of the April, 1913, Term of said court, the following order, *inter alia,* was had and entered of record in said court, in said [126]

cause, which said order is in words and figures as follows, to wit:

[Order Allowing Appeal, etc., in Case No. 11.]

11.

MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY, a Corporation,

Defendant.

Comes now the defendant by counsel and prays an appeal to the United States Circuit Court of Appeals for the Ninth Circuit from the judgment rendered against it on the 14th day of January, 1913, and shows to the Court that it has filed a prayer for appeal and assignment of errors herein and paid into the hands of the Clerk of the court the sum of One Thousand Five Hundred Dollars, to stand as security in lieu of bond on such appeal. It is now, therefore, ordered by the Court that the said appeal be allowed and said deposit of money accepted in lieu of bond as security to be forfeited by the plaintiff, or so much thereof as shall be necessary for its indemnity, if the said defendant shall fail to maintain and make good its plea on such appeal. And it is further ordered that the clerk deposit said sum of One Thousand Five Hundred Dollars so paid to him in the registry of the court until the further order of the Court.

And it is further ordered that this order and all of the files relating thereto supersede the order of May

9th, 1913, allowing an appeal herein in so far as they may be in conflict therewith.

[127] No. 12.

THE MINE & SMELTER SUPPLY COMPANY,
a Corporation,
Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,
Defendant.

Transcript of the Minute Entries [in Case No. 12].

BE IT REMEMBERED, that heretofore and upon, to wit, the 7th day of October, A. D. 1912, the same being one of the regular juridical days of the October, 1912, Term of said court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

12.

MINE AND SMELTER SUPPLY COMPANY,
a Corporation,
Plaintiff,

vs.

ARIZONA COPPER COMPANY OF ARIZONA,
a Corporation,
Defendant.

It is ordered that this case be set for trial on Monday, November 18, 1912, at 10:00 o'clock A. M.

AND AFTERWARDS, and upon, to wit, the 18th day of November, A. D. 1912, the same being one of the regular juridical days of the October, 1912, Term

of said court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Trial in Case No. 12.]

[128] 12.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

This case came on this day regularly for hearing upon the report of the Master herein, George L. Hodges, Esquire, appearing as counsel for the plaintiff, and E. M. Hulse, Esquire, for the defendant. Argument of the respective counsel was had and the further trial of this case was ordered continued until Tuesday, November 19, 1912, at 9:30 o'clock A. M.

AND AFTERWARDS, and upon, to wit, the 19th day of November, A. D. 1912, the same being one of the regular juridical days of the October, 1912, Term of said court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Trial (Resumed) in Case No. 12.]

12.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

This case having been continued from yesterday's session of this court, comes now the same parties hereto and the [129] further trial of the case proceeds as follows: Further argument of the respective counsel was had and the case being now fully submitted to the Court, the same was by the Court taken under advisement.

AND AFTERWARDS, and upon, to wit, the 14th day of January, A. D. 1913, the same being one of the regular juridical days of the October, 1913, Term of said Court, the following order, *inter alia,* was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Order in Case No. 11 That Judgment be Entered.]

11.

MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

THE DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant.

This case having been argued and fully submitted at previous session of present term, and the Court now being fully advised in the premises, orders that judgment be entered herein in favor of the plaintiff in accordance with opinion signed and filed herein.

AND AFTERWARDS, and upon, to wit, the 7th day of April, A. D. 1913, the same being one of the regular juridical days of the April, 1913, Term of said Court, the following order, *inter alia*, was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Order of Submission of Motion for Rehearing in Case No. 12.]

[130] 12.

MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

It is ordered by the Court that the motion of the defendant for a rehearing herein be submitted upon the briefs on file herein.

AND AFTERWARDS, and upon, to wit, the 14th day of April, A. D. 1913, the same being one of the regular juridical days of the April, 1913, Term of said Court, the following order, *inter alia*, was had and entered of record in said court, in said cause, which said order is in words and figures as follows, to wit:

[Order Denying Petition for Rehearing in Case No. 12.]

12.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

The petition of the defendant for a rehearing herein having been heretofore fully submitted to the Court, and the Court being fully advised in the premises, does deny said petition.

AND AFTERWARDS, and upon, to wit, the 9th day of May, A. D. 1913, the same being one of the regular juridical days of the April, 1913, Term of said Court, the following order, *inter alia,* was had and entered of record in said Court, in said cause, which said order is in words and figures as follows, to wit: [131]

[Order Allowing Appeal, etc., in Case No. 12.]

12.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

Comes now the defendant and prays an appeal to the United States Circuit Court of Appeals for the Ninth Circuit from the judgment rendered against it on the 14th day of January, 1913, and shows to the Court that it has paid into the hands of the clerk of this court One Thousand Five Hundred Dollars in money to stand as security in lieu of bond on such appeal. And it is ordered by the Court that said appeal be allowed and said deposit of money accepted in lieu of bond as security to be forfeited to the plaintiff, or so much thereof as shall be necessary for its indemnity, if the defendant shall fail to make good its plea on such appeal. And it is ordered further that the clerk deposit said sum of One Thousand Five Hundred Dollars so paid to him in the registry of the Court until the further order of the Court.

AND AFTERWARDS, and upon, to wit, the 10th day of May, A. D. 1913, the same being one of the regular juridical days of the April, 1913, Term of said Court, the following order, *inter alia,* was had and entered of record in said court, in said [132] cause which said order is in words and figures as follows, to wit:

[Order Allowing Appeal, etc., in Case No. 12.]

12.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

THE ARIZONA COPPER COMPANY, a Corporation,

Defendant.

Comes now the defendant by counsel and prays an appeal to the United States Circuit Court of Appeals for the Ninth Circuit from the judgment rendered against it on the 14th day of January, 1913, and shows to the Court that it has filed a prayer for appeal and assignment of errors herein and paid into the hands of the Clerk of the Court the sum of One Thousand Five Hundred Dollars to stand as security in lieu of bond on such appeal. And it is now ordered by the Court that the said appeal be allowed and said deposit of money accepted in lieu of bond as security to be forfeited by the plaintiff, or so much thereof as shall be necessary for its indemnity, if the said defendant shall fail to maintain and make good its plea on such appeal. And it is further ordered that the clerk deposit said sum of One Thousand Five Hundred Dollars so paid to him in the registry of the court until the further order of the Court.

And it is further ordered that this order and all of the files relating thereto supersede the order of May 9th, 1913, allowing an appeal herein in so far as they may be in conflict therewith.

[Citation on Appeal in Case No. 11.]

[133] *In the United States District Court for the District of Arizona.*

No. 11.

UNITED STATES OF AMERICA,—ss.

The President of the United States of America, to the Mines and Smelter Supply Company, a Corporation:

You and each of you are hereby cited and admon-

ished to appear in the United States *Circuit of* Appeals for the Ninth Judicial Circuit within thirty (30) days from the date of this writ, pursuant to the appeal duly obtained and filed in the Clerk's office of the United States District Court for the District of Arizona, wherein you are appellees and Detroit Copper Mining Company of Arizona is the appellant, to show cause, if any there be, why the order and decree in said appeal mentioned should not be done to the parties in that behalf, and to do and receive that may appertain to justice to be done in the premises.

WITNESS, The Honorable WM. W. MORROW, Judge United States Circuit Court of Appeals, Presiding as Judge of the United States District Court for the District of Arizona, this 15th day of May, 1913.

WM. W. MORROW,
Judge.

[134] United States of America,
District of Colorado,—ss.

I hereby certify that I have duly executed the within writ as follows, to wit:

As to the Mines and Smelter Supply Company by delivering to Albert H. Seep, personally, as the Vice-President of the said The Mines and Smelter Supply Company, a true copy of the within writ at Denver, in said District, on the 12th day of June, A. D. 1913.

D. C. BAILEY,
U. S. Marshal.
By E. B. Chadwick,
Deputy.

Fees and Costs: $2.00.

[Endorsements]: #11. Marshal's No. 4232. United States District Court, District of Arizona. Citation. Filed June 17, 1913. Allan B. Jaynes, Clerk.

[Citation on Appeal in Case No. 12.]

In the United States District Court for the District of Arizona.

No. 12.

[135] UNITED STATES OF AMERICA,—ss.

The President of the United States of America, to The Mines and Smelter Supply Company, a Corporation:

You and each of you are hereby cited and admonished to appear in the United States *Circuit of* Appeals for the Ninth Judicial Circuit, within thirty (30) days from the date of this writ, pursuant to the appeal duly obtained and filed in the Clerk's office of the United States District Court for the District of Arizona, wherein you are appellees and Arizona Copper Company is the appellant, to show cause, if any there be, why the order and decree in said appeal mentioned should not be reversed and corrected and why speedy justice should not be done to the parties in that behalf, and to do and receive that may appertain to justice to be done in the premises.

WITNESS, the Honorable WM. W. MORROW, Judge United States Circuit Court of Appeals, Presiding as Judge of the United States District Court for the District of Arizona, this 15th day of May, 1913.

WM. W. MORROW,
Judge.

United States of America,
District of Colorado,—ss.

I hereby certify that I have duly executed the within writ as follows, to wit:

As to The Mines and Smelter Supply Company, by delivering to [136] Albert H. Seep, personally, as the Vice-President of the said The Mines and Smelter Supply Company, a true copy of the within writ at Denver, in said District, on the 12th day of June, A. D. 1913.

Fees and Costs: $2.00.

D. C. BAILEY,
U. S. Marshal.
By E. B. Chadwick,
Deputy.

[Endorsements]: #12. Marshal's No. 4233. United States District Court, District of Arizona. Citation. Filed June 17, 1913. Allan B. Jaynes, Clerk.

In the United States Circuit Court of Appeals for the Ninth Circuit.

No. 11.

THE DETROIT COPPER MINING COMPANY, a Corporation,

Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Appellee.

Order Extending Time to [August 4, 1913, to] Perfect Appeal [in Case No. 12].

[137] On motion of R. S. Taylor, Esq., and E. M. Hulse, Esq., solicitors for the Detroit Copper Mining Company, a corporation, the above-named appellant, in good cause appearing therefor, it is ordered that the appellant have to and including the 4th day of August, 1913, within which to docket the cause and to file a record on appeal in the United States Circuit Court of Appeals for the Ninth Circuit.

Dated this 28th day of June, 1913.

WM. W. MORROW,
United States Circuit Judge for the Ninth Circuit.

[Endorsements]: No. 11. United States District Court, District of Arizona. Mine and Smelter Supply Company, a Corporation, Plaintiff, vs. Detroit Copper Mining Company, a Corporation, Defendant. Order Extending Time to Perfect Appeal. Filed June 30, 1913. Allan B. Jaynes, Clerk.

In the United States Circuit Court of Appeals for the Ninth Circuit.

No. 12.

ARIZONA COPPER COMPANY, a Corporation,
Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,
Appellee.

Order Extending Time to [August 4, 1913] to Perfect Appeal [in Case No. 12].

[138] On motion of R. S. Taylor, Esq., and E. M. Hulse, Esq., solicitors for the Arizona Copper Company, a corporation, the above-named appellant, in good cause appearing therefor, it is ordered that the appellant have to and including the 4th day of August, 1913, within which to docket the cause and to file a record on appeal in the United States Circuit Court of Appeals for the Ninth Circuit.

Dated this 28th day of June, 1913.

WM. M. MORROW,
United States Circuit Judge for the Ninth Circuit.

[Endorsements]: No. 12. United States District Court, District of Arizona. Mine and Smelter Supply Company, a Corporation, Plaintiff, vs. Arizona Copper Company, a Corporation, Defendant. Order Extending Time to Perfect Appeal. Filed June 30, 1913. Allan B. Jaynes, Clerk. By F. E. McCrary, Deputy.

[Notice of Motion for Order Approving Condensed Testimony.]

[139] *In the District Court of the United States for the District of Arizona.*

Nos. 11 and 12.

THE MINE AND SMELTER SUPPLY COMPANY,
Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA,

and

THE MINE AND SMELTER SUPPLY COMPANY,

Plaintiff,

vs.

ARIZONA COPPER COMPANY,

Defendant.

To Hodges and Wilson, Solicitors for the Plaintiff in Said Causes, Denver, Colorado.

Gentlemen:—

You are hereby notified that on June 5, 1913, we lodged in the office of the clerk of said court at Phoenix, Arizona, a copy of the testimony contained in the record in said causes, condensed and simplified as required by paragraph (b) of Equity rule 75; and that on Saturday, June 21, 1913, we shall ask the Court, or if the Court should not be in session, the Judge thereof, to approve the said statement so filed; and you are further notified, in case you desire to present any objections to or amendments of said statement to present them at that time and place.

[140] TAYLOR & HULSE,
Solicitors for Defendant.

Service of the foregoing notice acknowledged this 10th day of June, 1913, at Denver, Colorado.

GEORGE P. HODGES.
D. EDGAR WILSON.

[Endorsements]: Nos. 11 and 12. United States District Court, District of Arizona. Mine and Smelter Supply Company vs. Detroit Copper Mining

Company of Arizona, and Arizona Copper Company. Filed June 17, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

[Stipulation Waiving Examination of Condensed and Simplified Statement That Clerk Prepare Record on Appeal in Accordance With Praecipe, etc.]

[141] *United States District Court for the District of Arizona.*

Nos. 11 and 12.

MINE AND SMELTER SUPPLY COMPANY

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA,

and

MINE AND SMELTER SUPPLY COMPANY

vs.

ARIZONA COPPER COMPANY.

STIPULATION IN RELATION TO APPEAL.

WHEREAS, judgment for the plaintiff was lately rendered by said court in each of said above-named causes, and

WHEREAS, each of said defendants has prayed an appeal to the United States Circuit Court of Appeals for the Ninth Circuit from the judgment so rendered against it; and

WHEREAS, the said two suits were for alleged infringement of the same patent, viz., U. S. patent No. 590,675 to Arthur R. Wilfley, dated September

28, 1897, by use of a number of ore concentrators of identically similar construction and operation, to wit, a concentrating table known as Deister Concentrator No. 2; and

WHEREAS, in the taking of the proofs in said two causes **[142]** it was agreed by the solicitors for the parties respectively, namely, Hodges and Wilson for the plaintiff, and Taylor and Hulse for the defendants, that the same proofs should be taken as applying to both cases, so that there is in fact only one record of testimony for the two cases; and

WHEREAS, said Taylor and Hulse, as solicitors for said appellants, prepared and lodged in the office of the Clerk of said District Court on the 5th day of June, 1913, a statement in condensed and simplified form of the testimony of witnesses contained in said record put in narrative form, said statement covering what form nearly all said testimony, but including also a relatively small portion thereof which counsel considered ought to be reproduced in the exact words of the witness; all in conformity with the requirements of paragraph (b) of Equity Rule 75; and

WHEREAS, said Taylor and Hulse duly notified said Hodges and Wilson of such lodgment, and named in such notice June 21, 1913, as the time, and the office of the clerk of said District Court as the place where they would ask the court or Judge to approve said statement; and

WHEREAS, said Taylor and Hulse at the time of filing said condensed and simplified statement of testimony filed also a praecipe in the office of the Clerk

of said court indicating the [143] portions of the record to be incorporated into the transcript on such appeal; and

WHEREAS, said Taylor and Hulse at the time of sending said statement to said Clerk also sent a copy of the same to said Hodges and Wilson, as solicitors for the plaintiff, which copy was duly received by them; and

WHEREAS, afterwards, and before the date named in said notice, said Hodges and Wilson as solicitors for the plaintiff prepared and lodged in the office of the Clerk of said court a condensed and simplified statement in narrative form of portions of the testimony of witnesses contained in said record additional to the portions embraced in said statement prepared by counsel for the appellants as aforesaid, the greater portion of said statement being in narrative form, but including also a relatively small portion of the evidence which counsel considered ought to be reproduced in the exact words of the witnesses, all in conformity with paragraph (b) of Equity Rule 75; and

WHEREAS, neither of the parties has any objection to offer to the condensed and simplified statement of testimony in the record proposed by the other, so that upon the whole they are in agreement on that subject, and it does not appear to them to be necessary to put upon the court or the Judge thereof the burden of examining said statements and comparing them with the record;

[144] NOW, THEREFORE, it is stipulated and agreed by and between the said parties appellant

and appellee as follows:

1. That the court or Judge thereof whose duty it would be in the absence of agreement between the parties to examine the said condensed and simplified statements and compare them with the record, be respectfully requested to accept this agreement of the parties in the place of such examination, and to confirm the same by the entry of an order a draft of which will be presented to the Court with this agreement.

2. That the Clerk of said District Court be directed upon the making of said order to prepare a transcript of the record in accordance with the praecipe filed by the appellant and also in accordance with the praecipe filed by the appellee; that in preparing that part of the transcript containing the testimony as it has been condensed and simplified by the parties he shall copy after the name of each witness, first, the condensed and simplified statement of his testimony prepared and filed by counsel for the appellants; and follow that with the condensed and simplified statement of the testimony of the same witness prepared and filed by counsel for the appellee.

3. Said Clerk shall entitle the case in his transcript as it is entitled at the head of this paper, but make and certify it as a single record.

[145] ROBERT S. TAYLOR,
ELWIN M. HULSE,
Solicitors for Defendants-Appellants.
GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors for Plaintiff-Appellee.

[Endorsements]: Nos. 11 and 12. Mine and Smelter Supply Company vs. Detroit Copper Mining Company of Arizona and Arizona Copper Company. Stipulations in Relation to Appeal. Filed June 26, 1913. Allan B. Jaynes, Clerk. By F. E. McCrary, Deputy.

[Order Approving Condensed and Simplified Statement of Testimony.]

United States District Court for the District of Arizona.

MINE AND SMELTER SUPPLY COMPANY

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA,

and

MINE AND SMELTER SUPPLY COMPANY

vs.

ARIZONA COPPER COMPANY.

[146] Come the parties by their solicitors respectively, namely, Hodges and Wilson for the plaintiff, and Taylor and Hulse for the defendants, and show to the Court that in preparing the record in said causes for appeal to the United States Circuit Court of Appeals they have proceeded in all respects in obedience to Equity Rule 75, and by mutual agreement and understanding have made up and completed a condensed and simplified statement of the testimony of the witnesses contained in said record in accordance with said rule and request the Court to accept and approve the same, which is now done.

And it is thereupon ordered by the Court that the condensed and simplified statement of the testimony of the witnesses in said cases as so made up by the parties be and the same is approved by the Court as a complete and sufficient compliance with Equity Rule 75 and with the law in all respects.

WM. W. MORROW,
Judge U. S. Circuit Court of Appeals.

[Endorsements]: Nos. 11 and 12. United States District Court, District of Arizona. Mine and Smelter Supply Company, Plaintiff, vs. Detroit Copper Mining Company of Arizona, Defendant, and Arizona Copper Company, Defendant. Order Approving Condensed Statement. Filed July 2, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

[Defendant's Condensed Statement of Evidence.]

[147] *In the United States District Court Within and for the District of Arizona.*

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

CONDENSED STATEMENT OF THE EVIDENCE TO BE INCLUDED IN THE RECORD ON APPEAL PREPARED BY SOLICITORS FOR THE DEFENDANT IN COMPLIANCE WITH RULE 75 OF THE EQUITY RULES.

INTRODUCTION.

The following statement is made up from the volumes of the printed record, beginning with the volume entitled "Record of Pleadings, Stipulations and of Testimony taken on behalf of complainant."

It was stipulated by counsel that the uncertified printed copies of patents should be admitted on either side; that counsel introducing exhibits should retain possession of them until the hearing; and that the plaintiff has been the owner of the [148] patent in suit since about October 12, 1905.

[Complainant's Condensed Statement of Evidence.]

In the District Court of the United States for the District of Arizona.

No. 11—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant,

and

No. 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

FURTHER CONDENSED STATEMENT OF THE EVIDENCE TO BE INCLUDED IN THE RECORD ON APPEAL. PREPARED BY SOLICITORS FOR THE COMPLAINANT IN THE ABOVE-ENTITLED CAUSES, IN COMPLIANCE WITH RULE 75 OF THE EQUITY RULES.

[149] INTRODUCTION.

The following statement of the evidence to be included in the record on appeal is intended to supplement the condensed statement prepared by solicitors for the defendants, in accordance with the suggestions made by said solicitors for the defendants in their brief accompanying their said condensed statement.

Testimony of witnesses for complainant given in *prima facie* case taken from the printed record entitled, "Record of Pleadings and Stipulations and of Testimony taken on behalf of Complainant."

[Testimony of Henry Eggers, for Plaintiff.]

(Defendant's Condensed Statement.)

HENRY EGGERS, a witness for the plaintiff, states that he has had charge of the mining machinery sales of the Mine and Smelter Supply Company; has been familiar with the Wilfley concentrating table for something over two years; identifies "Complainant's Exhibit No. 1, Blue-print Wilfley Concentrating Table No. 10,685"; the blue-print represents the deck of the Wilfley table and the figures along lines H H, G G, F F, E E, D D, C C, B B and A A represent the heights of the riffle cleats

(Testimony of Henry Eggers.)
at the intersections with those lines in thousandths of an inch; identified "Complainant's Exhibit No. 2, cross-section Wilfley Concentrating Table No. 10,685"; it represents cross-sections taken at the lines referred to in Exhibit No. 1; identifies "Complainant's Exhibit No. 3, Model Wilfley [150] Table Deck"; states that it was not made on any definite scale but is a representation in outline of the construction of the Wilfley table as manufactured; counsel for plaintiff offers in evidence "Complainant's Exhibit No. 4, Wilfley Patent in Suit." Witness proceeds and states that he took measurements of one of the No. 2 Deister tables in use in the mill of the Arizona Copper Company at Morenci, Arizona, in July, 1910, and prepared a drawing from those measurements, a blue-print of which is marked "Complainant's Exhibit No. 5, Drawing Deister Table in No. 6 Mill of the Arizona Copper Company at Morenci, Arizona"; states that the exhibit marked "Complainant's Exhibit No. 6, Model Deister Table No. 2, Arizona Copper Company Mill No. 6, Morenci, Arizona," was made under his supervision; the direction of the vibrating movement in the Deister table is parallel with the riffles from head end to line B B; the distance from line A A to line B B is 10½ inches, and from line B B to end of long riffles 13 inches, and to end of short riffles 11 inches; identifies "Complainant's Exhibit No. 7, Combined Model of Wilfley and Deister Table" as prepared under his supervision; the width of the washwater board on the Deister table as constructed is 4½ inches and its

(Testimony of Henry Eggers.)

inclination 5/8ths of an inch; identifies "Complainant's Exhibit No. 8 Photograph Wilfley Table in Operation," and states that it fairly [151] represents the machine's operation under normal conditions.

Plaintiff

[Testimony of Robert H. Richards, for ~~Defendant~~.]

(Defendant's Condensed Statement.)

ROBERT H. RICHARDS states that he is Professor of Mining Engineering and Metallurgy in the Massachusetts Institute of Technology; began to teach in 1868; had charge of mining in 1873, and metallurgy in 1883; has made investigations as to working of tables in concentrating ore; is familiar with the Wilfley table; says the great advance made by Wilfley in his patent lay in the fact that he placed riffle cleats across the flow of the water, that is, at right angles to it, and that he terminated these riffles into what has been defined as advancing terminals; that is to say, each next riffle down the slope is longer than the previous one, bringing each succeeding tip nearer to the concentrates discharge end of the table; the whole set of advancing tips forms a diagonal on the surface of the table; is familar with the von Rittinger table; it has no riffles on it, and is inferior to the Wilfley table for want of the automatic action which Wilfley possesses; considers that the Wilfley table was a great advanced stride and initiated a new era in concentrators; Wilfley put his riffles on with the diagonal ending—the advancing terminals, as they are called, and from a structural

(Testimony of Robert H. Richards.)
point of view also tapered his riffles and so added to the strength of the machine in getting an [152] automatic control of the line of change of detention by such means; has seen a Wilfley table in operation under the conditions illustrated by Complainant's Exhibit No. 8 and, in his opinion, it illustrates a normal condition of operation; that part of the Wilfley table to the rearward of the line B B on the Wilfley table is not an absolutely essential part of the table, but acts as a guard in case of increased feed to take care of an overload; that part of the Wilfley table toward the concentrates discharge and from the line A A is not essential to the effective operation of the table; it adds a little to the cleanness of the concentration by the flow of water which comes down across it.

Q. What do you designate the portion of the Wilfley table that is occupied by the riffle cleats?

A. I like to call that the roughing plane, and by that I mean the top surface of all the riffles cleats.

Q. The tops of all the riffle cleats you treat as a distinct plane? A. As a distinct plane.

Q. And call that a roughing plane?

A. A roughing plane. That is where the roughing work is done, the removal of the large quantity of waste.

Q. And the portion at the ends of terminals of the riffles you call what?

A. I call that the diagonal of mechanical control of the line of change of detention.

(Testimony of Robert H. Richards.)

[153] Q. I refer now more particularly to the table surface.

A. The table surface I like to call the cleaning plane, which is the place where the last cleaning is done.

Q. Now, will you explain what you mean by change of detention?

A. If we consider a single riffle, and by that I mean the groove, on a Wilfley table anywhere along about the middle of the table, and we begin at the back end of that and follow it forward to see what is happening all along the line we shall see at the mechanism end it is simply carrying muddy water across the table. Pretty soon we reach the beginning of the quartz tailings, which are on the way to be separated from the pulp. We find here the coarsest quartz as the first grains we meet. Following along we find, if we should take a section down to the linoleum, a certain amount of heavy mineral in a layer beneath that quartz, that has been separated from the quartz, and as we go forward that layer of heavy mineral would increase in depth and the quartz would diminish in depth, at the same time the quartz grains diminish in size as we go forward. By and by when we got nearer to the tips of the riffle cleats when the groove was getting quite shallow we should find some of the largest grains of the heavy mineral were beginning to ride over into the next riffle below, but the bulk of all the concentrates would continually be pushed forward until it reached the tips. When it reached the tips of the riffle

(Testimony of Robert H. Richards.)

[154] cleats we should find that the ability of the table to detain the quartz was almost entirely expended that it can detain the heavy mineral and carry it out on to the cleaning plane, but it can to but a very slight extent, detain the quartz. This is what I mean by the change of detention. It is the change which takes place along that diagonal line of terminals where the quartz no longer can be detained upon the table except in minute quantities, and this is an illustration of my definition of the line of the change of detention.

Q. Will you define a riffle as you understand it, Doctor?

A. As I understand a riffle, it is a hollow, basin, pocket or cavity in a carrying surface used for carrying pulp, into which grains of pulp may settle. In regard to their ability to settle, the grains of higher specific gravity have greater ability to settle and stay than grains of lower specific gravity; in fact, a grain of higher specific gravity coming along to a riffle may displace a grain of lower specific gravity which is already bedded in the riffle, a grain of higher specific gravity may displace a grain of medium specific gravity, a grain of medium specific gravity when displaced may go down to the next riffle and displace a grain of lower specific gravity, and so it will go until the grains have found their places, those having greater stability being in the upper riffles and those having less stability being in the lower riffle.

[155] I am aware that in the literature and in fact in the proceedings of previous cases the term

(Testimony of Robert H. Richards.)

"riffle" has been applied to the cleat which is tacked on to the surface of the table. I argue that a cleat is not a riffle, and my line of argument to demonstrate that point is this: If we were to tack a dozen riffle cleats on the surface of the Wilfley table so close together that there was no space between them, they being tacked on parallel to the direction of throw, those dozen riffle cleats would only make one riffle; that one riffle would be the little basin or cavity above the upper or first one of the cleats. I argue, therefore, that if a dozen riffle cleats are not a dozen riffles, then one cleat is not a riffle. A single cleat may make a riffle in combination with the surface to which it is attached by making a little basin cavity above it into which grains can settle.

The witness stated further in relation to the tapering riffles of the Wilfley table that whether the taper shall be continuous or interrupted by one or more offsets is not very material to the operation or result; that it could be made to step off gradually or run in a continuous slope with substantially the same result.

(Plaintiff's Condensed Statement.)

ROBERT H. RICHARDS.

[156] Q. I will ask you what you regard as the departure, if any there is, in what is known as the Wilfley table as described in the patent, that is, the departure from the prior art as it was practiced in the dressing of ores.

A. The great advance made by Wilfley in his patent lay in the fact that he placed riffle cleats across

the flow of the water, that is, at right angles to it, and that he terminated these riffles into what has been defined as advancing terminals; that is to say, each next riffle down the slope is longer than the previous one, bringing each succeeding tip nearer to the concentrates discharge end of the table. The whole set of advancing tips forms a diagonal on the surface of the table.

Q. What was the effect mechanically of so adjusting the terminals of the riffles with reference, if it had any reference, to the arrangement of material as you have described the same to have occurred upon the smooth surface of the von Rittinger type of table?

A. I think I can best define the behavior of the von Rittinger table by describing an experiment done by me, and I will then show the difference between it and the Wilfley design. At a certain mill where I had been installing a classifier I expressed my wish to see whether these riffle cleats with diagonal terminations really did accomplish any result which could be said to constitute them an important improvement. **[157]** Out of six Wilfley tables that were creating the six spigot products of this classifier we chose the third, in which there was the greatest variation in size and rather the largest quantity of ore fed. I expressed my desire to my friend who was one of the owners and the manager of the mill, to try this experiment, and he said he would like to see the experiment tried also. We took off all of the riffle cleats from the Wilfley table except the

(Testimony of Robert H. Richards.)

upper six. We left those upper six on the table simply to prevent the rush of feed water from carrying the grains down in an improper way and to give all the grains a fair start across the table preparatory to the treatment upon the smooth surface table. This start proved to be well chosen and well made. We then observed the most extraordinary result, namely, the pulp ranged all the way from the upper corner of the concentrates discharge end, down the end and along the tailings discharge side until it reached a point directly down from the tip of the remaining riffle cleat directly down the slope. This product was beautifully graded from the clean concentrates which extended a considerable distance along these edges. We then came to the middlings which were graded from a little bit of quartz with much pyrites and gradually diminished the pyrites and increased the quartz until we came to the end where the pure quartz was in a line formed down below the end of the remaining riffle cleats. We all threw up our hats and said, "What a splendid thing!" We ran this table but a very short time before it became convincing to us all that we had not made an improvement at all, but that we had made a great step backward, and that the step backward was due to the fact [157¼] that we had no control of the line of change of detention. So long as the table was fed with perfect evenness as to the quality of pulp as to the size of pulp, as to composition of pulp, and as to quantity of pulp, and with perfect evenness as to the quantity

of water in the feed pulp and the quantity of wash water, this table seemed to be successful. The instant a change came, the line of change of detention swung away from the position in which we had first found it and the concentrates ran into the tailings box or the tailings into the concentrates box. If the feed diminished the former took place; if it increased the latter. Either change would ruin the work of the table. To run such a table as that with any success at all it would have been necessary to stand by it, just as the driver of an automobile does who runs his automobile and guides it every instant of time—one would have to have control of the water, control of the feed, and control of the slope of the table constantly in order to maintain that line. That of course is impossible in a mill. The table must be automatic. We therefore threw it out and considered it a failure.

I ought to make one more remark in regard to the difference [157½] between that and the von Rittinger table. That was a true von Rittinger table in respect to the surface. It differed from the von Rittinger table only in the fact that we had greatly widened the table and shortened it in length, the two qualities which appear as two of the primary qualities in the Wilfley construction. This explained to me why it was that the von Rittinger table has to a certain extent held its own in foreign mills, namely, that it had always had its length in the direction of the flow of water and its width comparatively small so that the swing of the line of

(Testimony of Robert H. Richards.)

change of detention would be comparatively little. The great advantage obtained by widening the table and thereby widening the zone of separation into two or three minerals there was completely lost on the von Rittinger table. When we returned to the Wilfley construction and put back the riffle cleats with the terminals advancing along a diagonal line we restored the Wilfley table to having a very perfect control by mechanical means of this line of change of detention, and the table immediately became automatic, requiring an attendant to visit it from time to time, but practically automatic. [157¾] In view of this experiment and other conclusions which one must draw from it, it has seemed to me that while von Rittinger discovered the great principle of using two conflicting forces, namely, the jerking force to move the minerals across the table and the flow of water to bring the minerals down the table, thereby succeeding in getting this diagonal, he had so far failed in making a great advance in ore dressing that his table found but little use in this country.

Wilfley's invention increases the capacity very largely, and the efficiency of tables of von Rittinger type, and there became a demand for it in the concentrating mills. Its use spread all over the United States, and as well abroad.

Q. Now, I will ask you, Doctor, to take the model of the Wilfley table, Complainant's Exhibit No. 3 and the model of the Deister table, Complainant's Exhibit No. 6, and describe and compare first

(Testimony of Robert H. Richards.)
structurally and then functionally, the parts or elements of the two tables.

A. Following a riffle, and by that I mean groove, on the Wilfley table, I have already stated that the first thing we should come to would be the muddy water and slimes including fine particles of mineral that are flowing across the table, and this would occupy the space at the mechanism end of the riffle or groove. The next thing we should come to would be the coarser quartz, and those coarser grains of quartz would move towards the concentrates end until their ability to stay in the groove was **[158]** overcome by the carrying power of the downward flow of water. They would then fall over the cleat into the next groove and would move on there for a moment and then come to the limit that they were able to withstand against the carrying power of the water and again go down. The act would be repeated over and over until they reached the lower edge of the table where the tailings go off. Following along the groove we find the finer grains, and these grains maintain themselves in the particular groove under consideration, moving towards the concentrates end, until they have reached a point where they no longer can resist the carrying power of the water and they are carried over. The smaller grains will then zig-zag down the table towards the tailings discharge side, just as the larger ones did, but they will be in the zone along a diagonal in advance of where the coarser grains are. By and by we will find the concentrates at the bottom of the

(Testimony of Robert H. Richards.)

groove are beginning to show. They are increasing as we move forward, while the fine quartz is being lifted over, and when we get near the tips then some of the coarser grains of concentrates will reach a point where they cannot maintain themselves against the carrying power of the stream of water and they will be carried over and then moved along in the next groove until the groove shallows sufficiently for them to be carried over. The bulk of the concentrates, **[159]** however, will move out until they reach the tips at which points the quartz is nearly all removed from the concentrates and these concentrates will pass out into the zone and move along the surface of the table down a diagonal band that is a little above the diagonal line, of advancing terminals, until it reaches the discharge end.

In describing the Wilfley table I have described it as it is constructed and used and not with the steps in it as shown in this model Complainant's Exhibit No. 3.

Taking the groove on the Deister table, Complainant's Exhibit No. 6—and I take this from my experience in watching the Deister table as it has not been my privilege to work with the Deister table to anything like the degree that I have worked with the Wilfley, but from my experience with the Wilfley table and from watching the Deister on a number of occasions, I judge that the behavior of the pulp in the riffle of the Deister table is like this: The fine mud cannot get away from the rest of the pulp by

(Testimony of Robert H. Richards.)
falling directly down the slope as it does in the Wilfley table. It therefore flows down in a diagonal direction, being penned in by the bar or end on the mechanism end of the table, and the fine slime will therefore be mixed with the coarser quartz. The arrangement of the particles of the quartz will be much the same in this riffle groove upon the Deister table as it is in the case of the Wilfley. There will be this **[160]** difference—the Deister riffle cleats are of the same size in the upper section, three-sixteenths of an inch high; in the second, third, and fourth sections they are one-eighth of an inch high; in the early portions of the riffle as we move from the mechanism end towards the concentrates discharge end. When we get to within twenty-three and a half inches approximately of the concentrates discharge openings the riffle cleats are stepped from one-eighth of an inch high to one-sixteenth inches of the concentrates discharge openings they are stepped off from one-sixteenth of an inch high to one-thirty-second of an inch high; and when we are within two inches of the concentrates discharge openings, approximately, the alternate riffle cleats are ended. This will make a little change in the behavior of the pulp from its behavior on the Wilfley table. During its passage through the one-eighth inch high groove only the largest grains will go over unless there is a heaping up of grains (what we call on the streets a congestion of people) a congestion of grains takes place; then as a result of that congestion the quartz may be forced over from

(Testimony of Robert H. Richards.)

the particular riffle groove which we are discussing into the groove below. When we reach the stepping off then there will be a great increase at that point of grains that are pushed out and falling over and not able to withstand the downward flow of water, there will be great influx of grains into the groove below, and the groove below that, and so on down the table. This stepping-off **[161]** from one-eighth to one-sixteenth in height of riffle cleat takes place along a diagonal line and this diagonal line affects this change of detention that I have just mentioned; in fact, it is a diagonal line of terminals down the table and it effects a change of detention along that diagonal line of terminals. Following along the portion which is one-sixteenth of an inch high we see just the same thing happen that did in the earlier part of the one-eighth inch high riffles, after the great rush of grains had gone over the next cleat to the next below, and so on, then the grains will move along in that groove, only being removed when the congestion of grains forces them over, until the next step-off is reached where the riffle cleat steps down from one-sixteenth of an inch to one thirty-second of an inch there will be a second rush of grains over the top of the riffle cleat and down into the next riffle, and over that next riffle cleat and down into the next riffle, and so on down the diagonal, and this second row of stepping-off of the cleats from one-sixteenth to one thirty-second is a second set of advancing terminals analogous to the Wilfley advancing terminals, and it

(Testimony of Robert H. Richards.)
sheds a lot of quartz grains all the way down, just as the first one did, only probably not so much as the first one did because the quantity that can be held in a one-sixteenth inch deep riffle is much smaller than the quantity that can be held in a one-eighth inch deep riffle. Leaving this second diagonal we come to a **[162]** third diagonal which is made by the alternate tips of the riffle cleats which terminate at about two inches from the concentrates discharge openings, and this forms still a third line of change of detention, for on this line the grains which were maintained in the riffle just above these shortened riffle cleats lose their support of a riffle cleat entirely when they pass beyond the end, just as happens on the tip of the riffle cleat on the Wilfley table. When the concentrates reach that point they are in two streams. There is a stream of concentrates which is the upper groove above that terminating riffle cleat, and a concentrates stream which is in the lower groove just below that terminating riffle cleat and these two mix at the end of the terminating riffle cleat and the wash-water which comes in there washes off the last of the quartz. It can be adjusted to get more or less water at this point, the idea being to wash off the last of the quartz and then let the concentrates pass down and be guided into the concentrates opening by the lower riffle cleat of the pair, which goes directly to the guard wall of the concentrates discharge opening. Its behavior at this point is just the same to my mind as the behavior at the tip

of the riffle cleat of the Wilfley table where the concentrates pass out from the detaining power of the riffle cleat on to the smooth area and meet the downflowing side rush of water; so on the Deister table the concentrates pass out from these two riffles in this little open space two inches **[163]** long and meet there a stream of water concentrated upon them, washing across them, to wash out the last of the quartz, and then they go down here into the concentrates discharge opening. The only difference between the two tables is the method by which these concentrates grains are saved. On the Wilfley table they form a band and travel to the concentrates end of the table and then go over the end and are caught in a box. On the Deister table they are propelled that two inches of clear space, go down through the openings and are caught in a box at that place.

Going back to the difference between the tapered riffle cleat of the Wilfley table and the stepped riffle cleat of the Deister table, I can say that this is simply a difference in degree rather than a difference in kind; that whereas on the Wilfley table this shedding of grains from one riffle over into the next when the detaining power of the riffle upon the grains is overcome by the force of the wash water is gradual all the way along, in the Deister table it is by spurts and jumps. There will be a decided magnification of it along that rear edge where the larger grains form. Then as we move forward to the first step it will be diminished until we reach the first step, then

(Testimony of Robert H. Richards.)
it will be increased at that point for a short space, and then there will be an increased tendency to shed the quartz down the slope of the table. It will be diminished again as it reaches [164] the second step and after it has passed the second step it will be increased for a moment again and then, it will be diminished to a certain extent until it reaches the tips of the alternate riffles, and then the final ending of the detention will be at the ends of those alternate riffles except as the clean concentrates are detained by the intermediate riffles between the cut-off riffle cleats.

The Deister table, illustrated by the drawing, Complainant's Exhibit 5, and Complainant's Model Exhibit 6, answers to the description given in the claims of the Wilfley patent involved in the suit; Wilfley accomplished a stride in the art by the means disclosed in this patent, and that his invention constituted an advanced stride in the art of ore dressing is evidenced by the records of the United States Patent Office; the inventions prior to the Wilfley patent do not disclose the combination of roughing plane, cleaning plane and diagonal of mechanical control of the line of change of detention, while the patents subsequent to the Wilfley in nearly every case do exhibit these features; witness recites and describes some fifty patents in the art subsequent to the Wilfley showing and recognizing the feature of invention disclosed in the Wilfley patent.

On cross-examination says the result of Wilfley's discovery [165] divides the table into three parts

(Testimony of Robert H. Richards.)

—roughing plane, cleaning plane and diagonal of mechanical control of change of detention; this is the great advance that Wilfley has made, the advance that has made his table the forerunner of a new type of table; the end or terminals of the riffle cleats toward the concentrates discharge end is the essential effective portion in the operation of the Wilfley table; the main effective portion of separation occurs under these conditions substantially in the space AA–BB; that surface A, described in figure 3, in Wilfley patent drawings, in addition to serving as a cleaning surface as the material passes from the riffle tips outward, also serves to carry the wash water downward across the table toward the riffle tips; that the essential effective portion of the riffle cleats in the operation of the Wilfley table is in the end or termini, because it is the point at which the support of the gangue grains is removed and the flow of the wash water from that point on has sufficient force to prevent nearly the whole of the quartz or gangue from being detained on the surface of the table; this is really the most important point there is in the separation by the Wilfley table; referring to space on exhibit 8, between the line BB and the mechanism end of the table, witness states that when the table is fed normally with an even feed and the feed is free from slime or fine mud, that portion of the table simply **[166]** carries off the excess of feed water and some of the excess of wash water; it has no other significance; those two uses can hardly be said to be important enough to make that large area an essen-

(Testimony of Robert H. Richards.)
tial feature of the table; the feature which this portion of the table does utilize is that if the table is fed with uneven feed it is there to handle the overload; the second feature: if the table is fed a mixture of fine slime with the ordinary pulp it gives an opportunity to separate the fine slime; neither of those features is essential to the main feature of separation; you could dispense with it; the purpose of the part from the line AA is to convey the concentrates after they have emerged from the ends of the riffles to the concentrates end; also to do a little final cleaning, and it carries and directs the film of water from the wash-water box.

Explaining the feature of the step-off arrangement of the Deister riffles, witness states that as the grains are passing along the grooves toward the concentrates end of the table, they suddenly find themselves released from the penning up action of the higher riffle cleat and they are freer to pass over the lower riffle cleat, which is towards the concentrates end of the line AA, and the top grains of the layer do so pass over. There is, therefore, a change along this line AA, of grains of gangue being more penned upon the mechanism side of the line than to the condition of greater freedom on the [167] concentrates side of the line AA; in practical operation the actual physical termination of the cleats where they are tapered or lowered by steps may not in all cases be the operative or functional termination of the riffle cleats in the practice of concentration, if the obstruction is low or slight enough, rela-

(Testimony of Robert H. Richards.)

tive to the more elevated part of the riffle cleats; the lowest portion of the riffle cleat in physical construction may act relatively as a smooth or unriffled surface in the separation; in the Deister table, under an adjustment which would bring the line of final separation of the waste from the values towards the concentrates end of the table from the line BB, the final cleaning operation would occur along the terminals of the shorter riffle cleats on the line DD, or somewhere in the space between the line BB and the line DD, assuming an adjustment which would bring the line of final separation in the diagonal zone between the lines AA and BB, and in each case the concentrates were sufficient to fill the channels between the riffle cleats in the diagonal zone between the lines BB and DD, the area between BB and the end at the head motion of the table would be what I call the roughing plane, where the tailings are nearly all eliminated, and the diagonal zone between BB and DD acts as the cleaning plane, in which the concentrates are being conveyed forward to the concentrates discharge end; with the exception of a slight elimination of [168] quartz between the lines BB and DD, those channels would be acting merely as conveyors to the concentrates, and that surface would be a relatively smooth surface, sufficiently smooth to expose the waste, while retaining and guiding the values to the receptacles provided for them; whatever quantity of waste would pass out there would be exposed to the side wash of the water, just the same as it would be exposed by the terminals of

(Testimony of Robert H. Richards.)
the Wilfley riffles; when the word "smooth" or "unriffled" is used in the art it would have the meaning "smooth enough" or "unriffled enough" for the performance of the function which it is calculated to perform, in speaking of the roughing surface as compared with the cleaning surface of the table; it is not necessary on either Wilfley or Deister table, in practical operation, to perform the functions of advancing terminals of riffles terminating on a smooth surface that the smooth surface should have any definite dimension or form, only sufficiently smooth and large to accomplish the function described; the Deister table is a structure provided with a plane of unriffled portion of the suitable area located at the extremities of the riffles for the purpose specified in the Wilfley patent; removal of the upper concentrates corner and lower mechanism corner by which opportunity for the elimination of slime from the gangue and removal of excess feed and wash-water is provided, would not interfere with the performance of [169] the function of the riffles terminating diagonally upon a relatively smooth surface; the broad direction of the diagonal of termination of riffles on the Wilfley table is not a fixed feature—it may vary considerably and still have the advantage of advancing terminals; likewise the angle of termination of riffle tips on the Deister table might vary from the Wilfley angle, and this would not materially affect the embodiment of the Wilfley invention of advancing terminals of riffles terminating upon a relatively smooth surface; the step-off

(Testimony of Robert H. Richards.)

points on the riffles on Complainant's Exhibit No. 3, with same adjustments as to location of line of final separation, would operate identically as same construction on Deister table; it is not material that the mineral be conveyed from the smooth surface of the Wilfley table after separation is complete; it could be withdrawn by other means; the concentrates as they emerge from the riffles on the Deister table are subjected to continual washing on the unriffled or relatively plain surface, the operation being the same on both tables, but the concentrates being removed by openings in the Deister table and not conveyed to the end, as in the Wilfley table.

[Testimony of Clarence J. Glassbrook, for Plaintiff ~~Defendant~~].

(Defendant's Condensed Statement.)

CLARENCE J. GLASSBROOK

States that he has been a special representative of the [170] Mine and Smelter Supply Company in demonstrating the concentrating devices handled by that company since October, 1906, is acquainted with the Wilfley and Deister tables; has seen Deister tables in the form represented by Complainant's Exhibits No. 5 and No. 6, at work; prior to the advent of the Wilfley table the machines most in use were the Frue Vanner and the Gilpin county bumping table; remembers the Wilfley table since 1897; it was constructed with tapering riffles as now; it went into wide use immediately; the elements which contributed to the success of the Wilfley table were the re-

(Testimony of Clarence J. Glassbrook.)

ciprocating mechanism and the riffled surface; the adoption of riffles placed in longitudinal direction to the line of motion on a horizontal plane, the terminals of which riffles were on a diagonal line advancing downward and forward from the concentrates end of the feed box at the mechanism end of the table to the lower corner of the concentrates discharge end of the table—it was this construction which made the table so successful; it is not possible at all times and under all conditions to feed to a concentrating table a continuous and uniform supply of material or water; if this could be done it would be possible to extend the riffles the whole length of the table and yet secure a uniform product of concentrates; this being impracticable it was necessary to seek an automatic adjustment of material and treatment, and the diagonal termination of the riffles was most effective for that [171] purpose; in the construction of the Deister table the headboard along the mechanism side of the table is at a more acute angle than the corresponding headboard of the table shown in the Wilfley model; this causes the pulp to flow on a more restricted area, the effect of which will be to limit the surface over which the water and fine sands and mineral in suspension will flow.

(Plaintiff's Condensed Statement.)

CLARENCE I. GLASSBROOK.

The removal of upper concentrates corner and substitution of a wash-board at the extremities of the riffles and the removal of lower corner of mechanism end of the Wilfley table would not interfere, or only

(Testimony of Clarence J. Glassbrook.)

to a very limited extent in degree, rather than function, with the efficiency and capacity and the effectiveness of the operative functions of the combination of advancing terminals with smooth surface of the Wilfley table; the placing of riffles upon the surface of the table in a line parallel with the direction of the motion imparted to a greater or less extent is instrumental in effecting and controlling the resultant of two forces of end movement and side inclination, to a certain extent constitute effective means of controlling the location and direction of the diagonal lines of arrangement of material on the concentrating surface; that Wilfley's invention of advancing the terminals of his riffles along a diagonal line on the table surface not only takes [172] advantage of the natural line that would be produced by the two forces, but prolongs it and carries it out to a greater extent than would otherwise occur, making it possible to derive from its action a greater benefit and cleaner and better separation than could be made without it; the Deister table has not dispensed with any of the essential features of the Wilfley invention, but has embodied all of them; as applied to the practice of ore dressing, has never seen an absolutely smooth surface; so far as the mere act or function of riffling is concerned, a riffle need have no particular shape; the line of demarcation between a rough or riffled surface, functionally speaking, and a smooth surface, sufficiently smooth to perform the function desired, cannot always be accurately determined from physical construction—one may merge into the

(Testimony of Clarence J. Glassbrook.)

other; on Wilfley table what is called smooth or unriffled surface has to be sufficiently rough to retard the downward passage of the relatively heavier particles of value to be saved; in the practical operation of the machine it is immaterial whether that surface is covered with a roughness such as represented by linoleum, or whether it is a smoother surface made rough by slight scratches or slight elevations or depressions; in actual practice the condition would be the same; the proposition as to what constitutes smooth or dressing surface and what constitutes a riffled or roughing surface is [173] a relative proposition always, and the exact point at which the operation of roughing terminates and the final cleaning takes place is to some extent independent of physical construction; difference in operation between Deister and Wilfley tables by reason of restricted area of surface of former is not in actual function performed, but only in degree.

[Testimony of Arthur R. Wilfley, for Plaintiff ~~Defendant~~**].**

(Defendant's Condensed Statement.)

ARTHUR R. WILFLEY

States that he is one of the directors of the Mine & Smelter Supply Company, consulting engineer for that company, and a stockholder in the company; is the patentee of letters patent No. 590,675; has been concentrating ores and experimenting in concentrators for thirty-one years; his first table of the transversely inclined type having a reciprocating mechanism was a small experimental table in his

(Testimony of Arthur R. Wilfley.)

private testing plant in the spring of 1895; this table had one tapering riffle on the lower side; within a month or two he built a table about 4 feet by 8 with a transverse inclination and surface of rubber, and placed it on a bumping table mechanism, using a hammer for a bump; and on this table he placed riffle cleats of different length—as many as three anyway, the lower one extending from end to end of the table, the one on the upper side from the mechanism end about 4 feet and the middle one between these two, the three ending [174] on a diagonal line; has kept closely posted on what was being done in the mining regions of the Rocky Mountains; used several different surfaces upon his table—plate glass, linoleum, wood, sheet copper, and sheet steel; the glass was too smooth or slick; used many forms of riffle cleats; made experiments constantly for three months to develop the best form of riffle cleat; the result of the combination of riffled and unriffled surface was to make a difference of paying or not paying on the ore; the table immediately became very popular; something like twelve thousand are in use; the standard table first sold had a deck 16 feet long by 5½ wide, covered with linoleum, King-Darragh head motion; transverse inclination with riffles terminating on a diagonal line, the lower riffle extending from end to end, commencing at a given thickness at the mechanism end and tapering gradually to a feather edge at the concentrates end, feed box at the upper mechanism corner and wash-water box extending from the feed box to concentrates end of

(Testimony of Arthur R. Wilfley.)

table; has seen the Deister table; on it the feed box is parallel to the riffle cleats while the wash-water box is parallel to the terminals of the riffle cleats; there is a smooth surface at the end of the riffle cleats for discharging the wash-water; there are holes at the terminals of half of the riffle cleats and some little distance from the terminals of the other half of the riffle cleats; **[175]** consider tapering form of riffle to be the best for a standard table to be applied to different materials; that was his opinion when he made his application.

(Plaintiff's Condensed Statement.)

ARTHUR H. WILFLEY

Describes his experiments on smooth-top table, Rittinger type, and the result of his addition of riffles thereto and the manner of his patent-described invention, placing the riffles where the same were most effective, and removing riffle protection where their absence was desirable to attain the best efficiency and capacity of the apparatus; that his experiments were to find some way of passing gradually from the catching qualities of the corrugated or channeled surface to a smoother surface, and finally developed the diagonal termination of riffles at the point considered, the roughing plane with the clean-ore plane, bringing it to a cleaning point gradually; after some experiments with a belt table he resorted to the transverse inclination table, and running such a table with a smooth surface developed the natural diagonal line due to the wash-water and the mechanism, the co-efficient of the two; then adopted the

(Testimony of Arthur R. Wilfley.)

roughing or protecting surface to one side of this natural diagonal line and allowed the other to be exposed, giving a constantly stratifying and catching quality to one side and a cleaning effect on the other side of this line of [176] separation, and also giving at all times the opportunity for a particle to retreat to the stratifying plane, where it might be retained; discovered value of the protection and support of a series of riffles adjusted with reference to this diagonal line in the stratification and arrangement of the pulps for submission to the cross-flow of the water progressively as the protection of the riffles was gradually withdrawn along approximately this natural diagonal line of separation, giving the surface a stratifying effect where particles might be dropped down into the channels and become entirely protected from the wash of the water, and stratifying in this form and be carried forward towards the cleaning zone and to approach and pass on to this cleaning zone without being disturbed, while lighter particles resting on top of the strata of mineral would gradually become exposed as the riffles terminated, and would be washed back the mineral remaining on the cleaning surface without having been disturbed; any particles washed off of the top being washed down into the channels, with greater holding capacity below, were carried forward again, with another opportunity to be saved; this was repeated down the diagonal line, there being a gradual passing from roughing zone to cleaning zone, not merely treating a portion of the ore on the riffled or roughing

(Testimony of Arthur R. Wilfley.)

surface and then on the smooth surface [177] but a combination, one passing into the other insensibly; this result was accomplished by the advancing terminals of riffles without regard to any particular form or shape of riffle cleats; made experiments with the disposition of riffle cleats, so to vary the direction of the diagonal terminations thereof, and found that by such changes the riffles controlled the diagonal line of separation of the material within a certain range; in describing experiments with the smooth-top table of the Rittinger type, states that the line of separation is very hard to maintain on any particular point on the table, making it hard to control the concentrates and the tailings, so that you can put a divider on the table and save concentrates and reject tailings; this line will vary materially in case of variations in the quantity of mineral in the pulp, variations of water and numerous other variations that necessarily occur in a mill; the line will move so easily it is almost impossible to operate a table of this type in a mill in a practical way; even though you were to stand at the controlling lever every moment of time and make a perfect cut of a line of separation the work is not good; the riffled surface has at least double the capacity with anything like the same efficiency under the same conditions.

Q. I will now ask you to describe the operation of the Wilfley table, and from your knowledge of the operation of this [178] type of table under proper adjustment, to compare with it the operation of the Deister table as you understood it to be.

(Testimony of Arthur R. Wilfley.)

A. When the pulp is fed upon the Wilfley table from the feed box the heavy pulp spreads down across the deck in a broad diagonal band. The water in the pulp, even when the pulp is not sized and containing considerable slime, which we often call slime water, passes practically straight across the table and over the side, a certain amount of material settling out of this slime water into the channels between the riffle cleats. The back boundary of the heavy sand product will form in a diagonal line represented by the line BB on Complainant's Exhibit 8. The portion of the table between the line BB and the mechanism end represents the portion of the table where the slime water is passing over. The other boundary of the heavy sand is represented by the line AA on Complainant's Exhibit 8. The part of the table from the line AA on Complainant's Exhibit 8 to the mechanism end I term the roughing surface, and from the line AA to the concentrates end I consider the clean ore plane. A small band, say something like six inches wide, extending from line AA back towards the mechanism end I term the zone of final separation, and the line AA the line of final separation. Over the band of pulp represented by AA and BB is the constant film of water carrying pulp passing along diagonally over this surface and down over the side of the table. The [179] mineral is constantly being extracted from this film and dropping into the channels. In the bottom of the channels is a layer of strata of mineral forming. Along the line BB this strata will be very thin. As we

(Testimony of Arthur R. Wilfley.)
progress towards the line of final separation AA this bed of mineral will gradually increase in thickness due to the mineral constantly dropping in the channels. As the material moves forward this strata of mineral is on the bottom of the channels, on this gangue, as the mineral increases the gangue is raised to the top of the channels, where it is constantly being washed off, so we have a strata of mineral in the channels with a strata of gangue on the mineral moving towards the zone of separation. As it approaches the zone of final separation the gangue has washed off, so that when we reach that point the mineral begins to show through. We are then dealing with a certain amount of doubtful material on top of the mineral, in other words particles that are questionable whether to be saved or to be rejected. This is the part I call the zone of final separation. Taking a channel near the upper side of the table we find this action going on, so that this doubtful material as it passes through the zone of separation is forced off of the top of the mineral, the mineral lying in a well-defined strata on the bottom. In forcing off this heavy gangue there will be some particles of mineral forced off with it. As it passes down to the next channel it is caught again, and again passes through [180] the zone of separation and is washed off into the next channel below. This continues all down along the zone of separation, constantly bringing these doubtful particles up, giving them another chance, until we reach the lower concentrates corner of the table where we must make the final separation.

(Testimony of Arthur R. Wilfley.)

At this lower corner there is a riffle cleat extending the entire distance to the end of the table, so that at all times any particle that is rejected must be rejected over a channel which has a stratifying and guiding effect to the particle. A well-defined band of mineral passes out of the channels on the bed of the table and forms in a broad band approximately parallel to the line of the riffle tips, and passes over the end of the table. This band of mineral is represented by the material in advance of the line AA on Complainant's Exhibit No. 8.

On a Deister table, constructed on the principles and of the construction of Complainant's Exhibit Model No. 6 I would say the action would be about like this: When pulp is fed upon the table, the slime water will take a course along the end board of the table diagonally down to the lower side of the table. This band of slime water would not be very wide. Just in advance of this slime water would be the heavy sands. This would pass diagonally down across the table. If the table is being fed heavily this heavy sand may extend almost to the end board, and the slime water would pass over the top of the heavy sand. With [181] a light feed this band of slime water might be of considerable width. The band of sands will form in a diagonal line as they do on the Wilfley table, the mineral settling into the channels between the riffle cleats, and there will constantly be a film of water and pulp passing over this band of heavy material along a diagonal line. As this material would move forward under the action of the

(Testimony of Arthur R. Wilfley.)
mechanism, the mineral would be stratifying in the bottom of the channels between the riffle cleats, and on top of this would be gangue. As it is moved forward the mineral would increase in quantity, the strata would become thicker, and in such case the gangue would naturally be pared off, due to its being forced above the tops of the riffle cleats, and in this manner it will proceed forward, gradually paring off the gangue, and gradually increasing the bed of mineral, due to the mineral dropping out of the pulp passing over. As it reaches the first little jog in the height of the riffle cleats there would be a little additional paring out at this point, in fact considerable more paring takes place along that diagonal line of the change in the height of the riffle cleats. If the mineral contents were very great this line could well be used as a line of final separation, the difference in height of the riffle cleats being sufficient to make a retaining surface and an exposing surface on either side of the line. In most cases this decrease in height of the riffles would not be sufficient to complete the work, [182] and it would move forward; but the gangue being very much diminished and rapidly diminished along that line as it proceeded forward, it would come to the next step in height of the riffle cleat. From this point to the end of the riffle cleats I would consider the zone of final action. In most cases though because of this jog in the height of the riffle cleats the table might well be used on a great many ores containing a rather large amount of mineral by making a line of final separation along that

(Testimony of Arthur R. Wilfley.)

point and using the surface with the very small low cleats as an exposing surface or smooth surface. But for careful work and for I presume the majority of ore the better point for the final line of separation would be where each alternate riffle cleats end and from that point back to the first step, as I have said, I consider the zone of final separation.

As the mineral passes into this zone of final separation, we have what we call the doubtful material on top of the mineral again, just as I have described in the Wilfley table. At the upper end of the zone of separation, as we wash this doubtful material off, we no doubt wash off material or particles of mineral. They are washed down into the channel below, which has a greater holding capacity than the channel it left, and this repeated action goes on along down this zone of separation **[183]** exactly as it would in the Wilfley table. As we pass through the zone of separation to the end of the alternate riffle cleats, here the contents of one of the channels passes on to the smooth linoleum surface, the wash water giving it the final dressing, removing the last gangue that is to be removed. The one little riffle cleat extending to the opening in the table would retain the mineral, but being so low would retain no gangue, merely acting as a support to the mineral, as do the ends of the riffle cleats in the Wilfley table, and also just as does the lower riffle cleat in the Wilfley table, which acts as a support for the mineral passing out from the end of the table at the lower concentrates corner. The Wilfley table is

provided with a roughing surface sufficient to catch, stratify, and direct all the concentrates and enough of the tailings to secure protection to the concentrates up to the line of final separation. It is provided with a surface there which will hold the concentrates and retain them, but will expose all the gangue to the wash water and reject the last particle to be rejected.

The Deister table is provided with a roughing surface, with riffle cleats and channels sufficient to catch, hold, stratify, and direct all the mineral and enough of the gangue to protect the mineral up to the line of final separation. There it is provided with a surface capable of holding the mineral and yet exposing all the gangue to the arbitrary current of wash [184] water. At all times on the Wilfley table there is a riffle cleat over which the gangue must pass before reaching the tailings side of the table. The Deister table is constructed so that at all times any particle of gangue must pass over a riffle cleat before reaching the tailings side of the table. As the strata of mineral on the bed of the Wilfley table moves forward under the mechanism, the gangue is gradually pared off, so that when it reaches the line of final separation, there is no obstruction sufficient on the bed of the table to reach up through the strata of mineral and interfere with the washing off of the last gangue. On the Deister table the channels are sufficient to hold all the mineral and some of the gangue up to this line of final separation, and as the strata of mineral on the bed

(Testimony of Arthur R. Wilfley.)

of the table reaches the line of final separation, the table is provided with a surface that will hold the mineral, with no obstruction that will reach up through the strata or mineral to prevent the washing of the gangue. This line of passing from the protecting surface to the exposing surface of the Wilfley table is along a diagonal line extending from practically the outer end of the feed box to the lower concentrates corner. The line changing from the holding to the exposing part of the Deister table is along a line practically from the end of the feed box to a point on the table near the lower concentrates end. Along this zone of final separation on the Wilfley table is the very **[185]** important part of the table. It is very much like taking a pan of pulp, panning it repeatedly, and panning off most of the gangue, and then panning it into another vessel, catching the middlings, and panning down to clean concentrates, removing the clean concentrates from the pan, and taking the middlings and repanning them, each time repanning them from a pan where it can be repanned again. This takes place on the Wilfley table very much in this way. The rough sands are sloughed off rapidly on the roughing surface, but as they come to the zone of final separation, we have a material in such a condition that we would call it doubtful. It is almost of the specific gravity of the concentrates and of almost the resistance, and yet not of sufficient value to be saved. Some particles have almost the same specific gravity and resistance as the gangue,

(Testimony of Arthur R. Wilfley.)
and yet should be saved. So that here is where we are doing the most important part of the work, just as you would do in a pan. After panning time after time, in the last panning you would be very careful to not reject any mineral and yet not to leave any more gangue in your concentrates than possible. This is so with the table. At the upper side in the channel between the upper riffle cleats there is a very similar panning effect going on, and what is being panned represents a small amount of middlings. It is panned into a channel, where it is repanned, the heavy gangue having been sloughed off by the **[186]** rough part of the table, and the great bulk of the concentrates having passed out on to the smooth surface of the table, where the work is completed. So that we have this repeated panning all the way down the point of the riffle cleats. By this I do not mean that the entire amount of material is being disrupted and repanned, but merely the small part that is sifting along over the top of the concentrates. This material is being constantly acted upon, passing along down this diagonal line, striking in the riffle below and coming up for repeated trials. In the Wilfley table, after the line of final separation is reached, there is a smooth surface which merely acts to convey the material to the end of the table and into the concentrates box and is there merely for convenience of construction. In the Deister table, after the line of final separation is reached, there are holds along the bed of the table where the concentrates would

(Testimony of Arthur R. Wilfley.)

be taken off instead of passing out on the smooth surface. These holes have nothing whatever to do with the concentration of the ore, but are merely a means of taking care of it after the work has been completed. On the Wilfley table, after the line of final separation is reached, namely, the tips of the riffle cleats, the process of concentration is completed and from there on it is merely conveyed. The Wilfley table embodies every principle of concentration embodied in the Deister table, and the Deister table embodies every principle of concentration in the Wilfley table.

[187] In the use of concentrating surface where corrugated rubber with grooves extending longitudinally was substituted for linoleum surface, the corrugations merely retained the mineral and conveyed it to the end of the table, but lines of separation took place along the riffle tips, the same as in the Wilfley table. By substituting proper sections in the combination model of the Wilfley and Deister tables the Wilfley table is represented, except there are little jogs in the heights of the riffles instead of a gradual taper; that in ninety per cent of the concentration of the country the Wilfley table might as well cut off the near ends of the riffle tips; that all the surface that is necessary is only so much as will be necessary to finally wash the material as it passes from the riffle tips; that he does not regard the entire surface represented by section Exhibit No. 7 A. W., of the combination model No. 7, as an essential part of his invention of combining a riffled

(Testimony of Arthur R. Wilfley.)
with a relatively smooth surface, and, referring to Exhibit No. 8, says it shows very distinctively the ban of heavy material represented by lines AA and BB; the portion back of that towards the mechanism end is merely carrying muddw water, in case the ore is unsized and very small material is settled out of this water and carried forward; in case pulp is being sized, which it often is, there would be no pulp to speak of there—it would be merely water passing this surface; in case that surface was removed and [188] sized pulp was being used, without slime water, it would make no difference whatever; in case it was removed where mixed pulp was being worked, the slime water would be deflected along down and over the sand and a certain amount of the mineral would be settled out into the sand, and it would make very little difference; have cut tables off in this way and found very little difference, whether the water is allowed, to flow straight across the table or whether it is carried along down the band with the heavy sand; the difference so slight that have never been able to detect any difference under normal conditions and normal load; in case of overload there is still very little difference; it may pile up against the end board and gradually work out; the Deister table in suit is so constructed as to respond to the claims of the Wilfley patent involved in suit; the distinction between riffle cleats being physicially and nominally riffles and functionally not riffles is a matter of relative terms and depends upon the work being done, the adjustments, etc.

[Testimony of John Michael Callow, for ~~De~~ Plaintiff.]

(Defendant's Condensed Statement.)

JOHN MICHAEL CALLOW

States that for nearly twenty years he has been engaged in designing and constructing mining and milling plants, especially concentrating plants and is president of the General Engineering Company of Salt Lake City, Utah, which has a metallurgical **[189]** laboratory for performing concentrating and ore dressing tests, and is equipped with Wilfley tables; has been familiar with the Wilfley table since 1897 or 1898; and states that it has covered the entire field of ore dressing and it is the predominating type of machine for the treatment of medium sized material; that the Wilfley table is one of the most important inventions made in the mining industry; that the von Rittinger table might be called the prototype of table having a motion in one direction and transverse inclination and using a film of water flowing down the slope of the incline; that Wilfley's invention consisted in placing riffle cleats on one portion of the concentrating surface and terminating them along a diagonal line, dividing the table into a roughing plane and a smooth plane; that the effect of the riffle cleats on the Wilfley table is to restrain or hold back the material and to guide it in the line of motion; that the effect of the diagonal arrangement of riffle terminals is the controlling or governing effect upon the line of separation between the gangue and the mineral pro-

(Testimony of John Michael Callow.)

ducts and within certain limits automatically controlling this line of separation on the table; that this automatic control has contributed most to the use of the machine in practice; that Complainant's Exhibit No. 8 photograph represents the Wilfley table in operation with a normal feed and under normal conditions; that the elimination of gangue and waste from values **[190]** is practically complete on line AA of the photograph and the band or zone of quartz or waste lie between the lines AA and BB of the photograph; that Complainant's Exhibit No. 3 model represents the Wilfley construction with the exception of the steps in the riffle cleats.

He states further that in November or December, 1909, he saw a Deister No. 2 table at the testing plant of the Miami Copper Company at Globe, Arizona, and it was of the same construction as the Complainant's Exhibit Drawing No. 5 and Exhibit No. 6 model; that the large spread of unriffled surface at the concentrates end of the Wilfley table is not absolutely essential to the successful operation of that machine; that he made an experiment on a Wilfley table five or six years before by cutting four slots in the deck along the diagonal line and discharged the concentrates through the slots into a launder beneath the table without affecting the operation or results of the machine in any way; that the riffles and smooth surface at the terminals thereof of the Deister table which he saw at the testing plant of the Miami Copper Company

(Testimony of John Michael Callow.)

were performing the same function in substantially the same way as it is performed in the normal adjustment of the Wilfley table in operation; that the line of demarcation between the mineral and gangue on the Deister table at the Miami Copper Co. was carried somewhere between the lines DD and BB of Complainant's **[191]** Exhibit No. 5 drawing and the zone of final separation was carried on the thin riffle cleats.

Comparing the operation of the Wilfley table and the Deister table the witnesses stated that, assuming the two machines to be fed with the same amount of feed, the material will spread over the tables and fill up the spaces between the riffle cleats; the tables will be adjusted transversely so that the material will have a downward course; as the head motion propels the material toward the concentrates end the mineral contents will find their way between the riffle cleats, the mineral on the bottom and the quartz or gangue above it; as the body of the material progresses more and more of the quartz will be sheered off until as we get near the riffle tips the mineral will begin to appear and the quartz will disappear; like adjustments might be established in the Deister table; the wash water would come across the broad expanse of the unriffled surface of the Wilfley table, and in the case of the Deister table it would come across the incline which lies immediately underneath the wash water box.

He further states that Complainant's Exhibits 7 A–W and 7 C–W are not essential to the operation

(Testimony of John Michael Callow.)

of the Wilfley table; that the riffle cleats of the Wilfley table conform to a natural diagonal line that will be formed by the material on the table when subjected to the various forces at play and keep the band of mineral intact and guide it towards the concentrates discharge, [192] which function is one of the chief functions of the diagonal arrangement of riffle terminals; that on the Deister table there would be a band of minerals for each alternate short riffle—between each short riffle cleat and the concentrates holes and that the only smooth or unriffled portion of the Deister table as illustrated on Complainant's Exhibits 5, 6, and 7 is the smooth space adjacent the end of each alternate short riffle, and that if the channels between the line BB and the concentrates discharge openings of Complainant's Exhibit No. 6 are filled with mineral in the zone between lines B B and D D there would be more or less of a passage of the mineral with gangue along that surface on the top of the mineral passing down in a diagonal line practically parallel with the riffle tips.

(Plaintiff's Condensed Statement.)

JOHN MICHAEL CALLOW.

All concentrating tables that have come out in competition with and to do the work of the Wilfley table have in witness' mind been patterned after the Wilfley invention; an embodiment of the Wilfley idea appears to be essential to efficiency and capacity; with the transformation from the Wilfley construction to the Deister, as illustrated by Complain-

(Testimony of John Michael Callow.)

ant's Combination Model, Exhibit No. 7, the Deister construction embodies and includes the effective operative surface of the Wilfley concentrator construction practically in its entirety; that the [193] Deister construction represented by the exhibits corresponds to the claims of the patent in suit.

[Testimony of Vernon E. Hodges, for ~~Defendant~~ Plaintiff.]

(Defendant's Condensed Statement.)

VERNON E. HODGES

States that he has been engaged in his profession as a patent expert and solicitor since January, 1886; has given much time to the subject of ore dressing; is familiar with the Wilfley patent in suit, and with its practical operation; the Wilfley table presents two main surfaces or planes, one of which is the riffled or roughing plane, and the other the unriffled or cleaning plane; the reference in the patent to riffles of unequal length has no significance beyond an intention to describe the arrangement of terminals along a diagonal line; the expression "triangular portion" as referred to the part marked A in Fig. 3 was evidently one of many forms which that portion of the table might have taken; passing to the Deister table, it is rhomboidal in shape and composed of an area occupied by the essential working elements of the Wilfley table; the inclined surface of the washboard of the Deister table is simply a part of the so-called smooth, plain, or unriffled part of the Wilfley table reduced to a minimum; the space occupied by the 1/32nd inch thick riffles pre-

(Testimony of Vernon E. Hodges.)

sents a relatively smooth, plain, and unriffled surface which would be still smoother when in operation owing to the fact that the shallow terminals fill up to their full capacity with [194] concentrates; no concentration takes place in the space occupied by those shallow riffles; the work of concentration is complete when the material reaches the line BB; does not find any limitation in claims 1, 2, or 7 to the form and dimensions of the so-called plain, smooth and unriffled portion; and while the words "varying in length" and "unequal in length" as applied to the riffles are employed in the claims, they were evidently directed to the actively operative ends of the riffles more than to the entire riffle; considers that those portions of the riffles on the Deister table that lie between BB and CC on Complainant's Exhibit No. 5 drawing perform no useful function as riffles and may therefore be disregarded and the space across which they pass treated for the purpose of considering the application of claim 1 of the Wilfley patent as though they were not there.

(Plaintiff's Condensed Statement.)

VERNON E. HODGES.

Speaking of the invention of the Wilfley patent, witness states that the table comprises a deck divided into two areas or planes, to take advantage of the natural arrangement of the constituents of the ore pulp in diagonal bands, in the order of their specific gravities, as a result of the two forces to which the same are subjected on the surface of the table,

(Testimony of Vernon E. Hodges.)

namely: end-wise motion imparted to the deck and transverse [195] flow of wash water across the same; this is brought about by arrangement of riffle cleats upon the surface of table, extending longitudinally with the diagonal arrangement of tips or terminals, thus presenting the two main surfaces of the table, one of which is the riffled or roughing plane and the other the unriffled or cleaning plane; the ore pulp with the water from the pulp box discharges from the uppermost riffle and the side-wash and end-wise motion of the table causes the material under treatment to flow transversely over the riffled portion and form in bands, as illustrated in exhibit 8; the heavier concentrates settle in the channels where they become stratified in the order of their specific gravity, and the lighter gangue or waste flows over the top of the riffle cleats and discharges from the table in a band; the reciprocating motion of the table causes the concentrate, stratified in the channels between the riffle cleats, to travel forward towards the concentrates discharge end where they form in diagonal bands, the heaviest concentrates extending farther up on the table and forming a line or band nearest the concentrates discharge end, and materials of less specific gravity forming in bands according to their specific gravities between this band and the silica band; on this surface the material is subjected to a side-wash of clear wash-water which washed back the lighter gangue and leaves the concentrates clean and free from silica; [196] the table illustrated in exhibit 4 is so adjusted that the

(Testimony of Vernon E. Hodges.)
band of lighter silica extends diagonally and is held by the terminals of the riffled portion, where it affords a support from beneath for the heavier concentrates, which, as they emerge from the channels between the riffle cleats, become sorted and reach their kind in the corresponding bands just beyond the terminals of the riffles. At these terminals of the riffles the doubtful grains of material are subjected to repeated re-examination and retreatment giving repeated opportunity for them to find their proper place, and if they do not become properly classified higher upon the table they have had time and opportunity to become so classified before the lowermost terminals are reached; the relatively smooth or unriffled area extending from the riffle tips to the concentrate discharge end of the deck supports and conveys the cleaned concentrates which have been forced by exposure to wash water to part company with the last remaining particles of the gangue as the riffle tips are approached and reached into the concentrate box, while also supporting and conveying the wash-water as it flows downward to the riffles extending below; in the Wilfley table the essential characteristics are that of a relatively rough area, which area is the riffled portion where the initial work of concentration is performed and the relatively smooth portion where the final separation takes place, a portion which must be smooth enough to permit [197] the side-flow of wash-water to wash away the lighter silica which arises to the top and at the same time sufficiently rough to cause the

(Testimony of Vernon E. Hodges.)

heavier concentrates to cling to this surface and permit the wash-water to flow over it, so that the concentrates retain their position on this surface by reason of a sufficient roughness in it, while the lighter weight is carried over the tailings discharge side of the table; the expression in the specification "smooth, plain and unriffled" is apparently employed to distinguish a portion of the table having these characteristics from a portion which is relatively less smooth and plain, as the two main surfaces of the table have relative characteristics of roughness and smoothness simply to enable them to deal with the conditions required on these two parts of the table; the change between these two surfaces is along a diagonal line which has been made to conform to and take advantage of what had been found to be a natural diagonal arrangement resulting from the forces operating on the table, and by so doing the protection of the material under treatment has been prolonged and is gradually withdrawn, so that in consequence a table of greater capacity and efficiency has been provided; in the specifications of the Wilfley patent reference is made to riffles of unequal length and also to triangular portion A of the table, but nothing found in the patent to indicate this reference to the riffles of unequal length had any [198] special significance beyond an intention to describe the arrangement of the terminals along a diagonal line; no reference is anywhere made in the specification to the opposite or mechanism end of the riffles, the construction of which is non-essential to

the successful and best operation of the concentrator; the expressions "unequal length" and "varying in length" are not intended to refer to the entire portions of the riffles, so much as to the terminals, the intention having undoubtedly been to express the condition of one terminal extending out beyond another, having the effect of unequal length in this regard. The expression "triangular portion," referring to part marked A, in fig. 3 of the Wilfley patent, evidently one of many forms this portion of the table might have taken, not requiring any special form or vast expanse of area.

"Passing now to the Deister table, as shown in Complainant's Exhibit No. 5, drawing, Deister table, in No. 6 Mill of Arizona Copper Company, at Morenci, Arizona, and Exhibit No. 6, model, the table as a whole is rhomboidal in shape or, when compared in a general way with the Wilfley table is composed of an area occupied by the essential working elements of the Wilfley table with the non-essential portion omitted or removed, as is well illustrated by Complainant's Exhibit No. 7–B–D–W. By removing Exhibit 7 A–W, corresponding to the portion marked A of the Wilfley patent in suit, and substituting therefor Complainant's [199] Exhibit No. 7–A–D, at one end, and by removing the portion marked Complainant's Exhibit 7–E–W, which is the least essential portion of the Wilfley riffles of the mechanism end of the table, and substituting therefor Complainant's Exhibit No. 7 E–D.

In this way a table is produced which conforms

(Testimony of Vernon E. Hodges.)

more nearly to the natural diagonal banding, clearly illustrated in Complainant's Exhibit No. 8, photograph, Wilfley table in operation. On the upper edge of this Deister table there is located the feed box, and the wash-water box instead of being in alignment with the pulp or feed box, is brought around in a position over the diagonal concentrates discharge area; so that it parallels, or substantially parallels, the flange or head part at the opposite or mechanism end of the table. Parallel riffle cleats extend from the flange or head part toward the concentrates discharge end, they being formed in three steps or levels, terminating along diagonal lines, the changes between which are indicated by the lines AA and BB on Complainant's Exhibit No. 5, drawing, Deister table in No. C Mill of the Arizona Copper Company; so that the channels at and near the concentrate end are very shallow, and as testified to by Mr. Glassbrook, about one thirty-second of an inch in depth on this portion of the table. Alternate riffles terminate a short distance back. By actual dimension it is two inches, and opposite the smooth, plain, and unriffled area thus formed outlets are made in the table for the concentrate, and back of these outlets the flanges are erected and spaces intervene between them, so that the [200] water descending from the wash water box above upon the smooth surface beyond these flanges is deflected around the concentrates outlets upon the smooth, plain and unriffled areas on the table surface adjacent thereto, and for some distance back toward the

(Testimony of Vernon E. Hodges.)
mechanism end of the table. At intervals throughout the riffled surface of the table, and also at the tailings discharge end, higher riffle cleats are arranged and these are numbered in the Exhibit No. 5, Deister table, and one, ten, twenty and thirty-two respectively. At the lower concentrates end of the table a division is made so that the middlings may be taken off at a point between the concentrates outlet and the tailings side discharge of the table. The Deister table has some improved form of head motion whereby it is reciprocated in a direction lengthwise of the riffles and the same transverse flow of water and pulps, and endwise motion and resultant settling, stratifying, conveying and banding is obviously present on this table, as I have fully described in connection with the Wilfley patent and table when in operation, and I find the same main characteristics of relatively rough and smooth areas or riffled and relatively unriffled areas in this Deister table as exemplified by Exhibits 5 and 6, as in the Wilfley invention and table. There are the differences I have mentiones, as well as others which I will mention, which differences from the Wilfley invention and table however [201] are in the non-essentials rather than in the essentials; the essentials of the Wilfley invention and table being present in the Deister table as shown in these Exhibits 5 and 6. One of the differences is in the reduction of the plain, smooth and unriffled portion A of the Wilfley patent to a minimum by removing this corner of the table and terminating it along the diagonal line and a short

(Testimony of Vernon E. Hodges.)

distance beyond the concentrates outlets and swinging the wash-water box from a position in line with the pulp box diagonally across this end of the table, but without omitting or altering any function or essential characteristic of the Wilfley invention.

The inclined surface of the wash-board of the Deister table as represented by Complainant's Exhibits Nos. 5 and 6, is simply a portion of the so-called smooth, plain and unriffled surface of the Wilfley table reduced to a minimum with the same effect of washing back the lighter quartz and gangue, while permitting the concentrates to emerge from beneath and find their way to the outlet and the construction of this table is such that it would cause the formation of the same unbroken bands, the adjustment of riffles being with reference to this object and this alone, the riffles preventing the bands from becoming disrupted when formed and affording the same protection and gradual withdrawal of protection and creating the same detention of silica up to the final line of demarcation beyond which the silica cannot progress further [202] on account of the side-wash of the water which holds and forces it back, but beneath and beyond which the concentrates travel, by reason of their greater specific gravity, which causes them to cling with greater tenacity to the table suface and causes them to progress as a result of the end motion of the table.

There is not only this relatively plain, smooth and unriffled surface practically surrounding the outlets for the concentrates but also the slightly deflecting

channels formed by the thirty-second of an inch thick terminals of the riffles extending a few inches back toward the mechanism end, which presents a relatively smooth, plain and unriffled surface and a surface which has the function of relative smoothness; or, in other words, a surface which is smooth enough to permit the unobstructed side wash of the water from the wash-water box, and at the same time which must be rough enough to facilitate and augment the clinging tendency of the heavier concentrates to the table surface at the concentrates discharge end. This portion of the table at the concentrates discharge end, where the terminals of the advancing riffles are located, would, in the operation of the table, be still smoother, and it would physically appear, owing to the fact that these shallow terminals fill up to their full capacity with concentrates as they pass over this portion of the table.

I find on this Deister table No. 457, as represented by Complainant's Exhibits Nos. 5 and 6, the same surface as disclosed [203] in the Wilfley patent, namely, a riffled surface and an unriffled surface. The riffles extend in the same direction and they terminate along a diagonal line as in the Wilfley patent and construction in a plain, smooth and unriffled surface, or, in other words, a surface which is smooth enough to permit the transverse flow of wash-water film there across, while at the same time, it is rough enough, as in the Wilfley patent and construction to retain, hold, and support the concentrates while the water passes on over them and

creates the final cleaning and separation. There is in effect the same end motion lengthwise of the riffle cleats, and the same feeds above the uppermost riffles and the location of the wash-water is slightly shifted, namely, to a point nearer the diagonal terminals of the riffles. So that, in this table, there is present the effective operative part of the Wilfley table with an elimination, so to speak, of portions which are not absolutely essential to the operation of concentration under fairly satisfactory conditions. The differences between the Deister table and the Wilfley invention and construction, in a word, is a difference in dimensions and proportions rather than a difference in kind and operation.

Applying the test and comparison of these three claims with the construction of the Deister table as understood and as exemplified in Complainant's Exhibits Nos. 5 and 6, and taking [204] the claims in their order:

First, in Claim 1, a transversely inclined concentrating table having a movement whose tendency is to carry the material longitudinally forward towards the tail or foot of the table. This description accords precisely with the construction here presented.

The second qualification of the claim, namely, the table provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length for the purpose specified. The purpose specified is not only stated in the portion of the specification which I have hitherto quoted, but is summarized in the

(Testimony of Vernon E. Hodges.)
following language, commencing with line 43, page 2, of the specification to wit:

"A portion of the gangue—that is to say, the latter part thereof,—passes over the riffles in succession from the shortest or uppermost to the longest or lowermost riffle. The mineral and heavier gangue are caught by the riffles and finally separated on the smooth portion A of the table. This combination in the concentrating tables of riffles of varying length for catching the mineral and a smooth, plain or unriffled portion at the extremities of the riffles where the final separation is effected, through the action of the water, is believed to be entirely new in an apparatus of this class.

[205] "A riffle is the best means of catching mineral, while a smooth plain or unriffled surface is the best for effecting the separation of the mineral from the gangue caught with the mineral by the riffles; the separation being effected by the action of the water."

Referring now to the construction shown in Exhibits 4, 5, and 6 which represent the Deister table, I find the riffles called for by the claim extending longitudinally a portion of the distance from its head towards its foot, said riffles varying in length for the purpose specified—that is to say, varying in length to perform the functions required of the terminals of the riffles, which function is the same and performed in the same way as the Wilfley patent and construction. The claim next recites a smooth, plain or unriffled portion extending from the extremities

(Testimony of Vernon E. Hodges.)

to the riffles toward the tail of the table, whereby the material as it leaves the riffles, is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue is effected. The construction on defendant's table is apparently with reference to this same condition and function—that is to say, the surface at the concentrates end and at the terminals of the riffles must be sufficiently smooth to serve as a clinging surface and also to convey the wash-water across the terminals of the riffles and over the bands of concentrates, while at the same time, the surface is not perfectly smooth, but, on the contrary, it is rough [206] enough to hold the concentrates in their progressive travel, due to the motion of the table, over this portion of the table, just as set forth in the Wilfley patent and as practiced in the Wilfley invention. In other words, this effective working part of the Deister table answers the terms of this claim when considered in the light of the description as referred to in the language for the purpose specified, with all the fidelity which any construction, not an exact copy of the Wilfley patent and concentrator, could reasonably do.

Taking the second claim, it first recites "A transversely inclined concentrating table having a number of longitudinal riffles extending a portion of the table's length from the head toward the foot. Second, said riffles being of unequal length, the uppermost being the shortest, while the other riffles increase in length from the upper edge to the lower

edge of the table, the table having a plain or unriffled portion lying at the extremities of the riffles and adapted to receive the material caught by the riffles."

When consideration is given for the fact, as has been testified to by different witnesses, that the lower mechanism corner of the Wilfley table is not absolutely essential to the effective work of ore concentration on that table, then it would seem a perfectly fair conclusion to reach that the variation in length must refer to an active, distinctly operative and essential portion of the [207] riffles, which portion is the terminal ends of the riffles, as those are the ends where the effective final separation is accomplished and where the saving is effected of the doubtful grains, the saving or loss of which goes largely to make up the difference between gains and losses and actual saving in ore concentration. In other words, it seems a perfectly reasonable interpretation to place upon the language of this claim, in view of the specifications and the actual operation of the Wilfley table that the reference made by the language is to the actively operative part of the riffles which continuously advance and terminate beyond those above and along a diagonal line; thus to all intents and purposes making the uppermost the shortest and the lowermost the longest, and the intermediate ones of correspondingly increasing length; and the terms of this claim, therefore, are to be found in the Deister construction.

Comparing the seventh claim with the Deister construction, element by element, as previously stated

(Testimony of Vernon E. Hodges.)

we find the transversely inclined concentrating table having a series of riffles extending longitudinally from the head toward the tail of the table, said riffles of unequal length, the uppermost being the shortest and the riffles increasing in length from the upper to the lower edge of the table, and the table provided with a plain or unriffled portion of suitable area, namely, a portion of sufficient smoothness to perform the function of a so-called plain and unriffled portion created at the extremities of the riffles. Also, there is means present [208] for feeding the material to the upper portion of the table's edge, namely, the pulp-box, and means for discharging the water on the upper edge of the table, namely, the wash-water box, and suitable means for imparting to the table, namely, the head motion, a longitudinal reciprocating movement of a character adapted to move the material from the head toward the tail of the table.

In conclusion of this answer, I do not find any limitation in either of these claims, namely, one, two, and three, to any specific form of riffle. Indeed, the specification emphasizes the fact that patentee, while he prefers the angular form shown and described, yet, that he does not limit his invention to any special construction of riffles. Neither do I discover any limitation to the form and dimensions of the so-called plain smooth and unriffled portion, which portion, while described in the specification and in the only illustration shown as triangular in form, is not so specified in these claims, and it is evident to my mind that it might be of any form and dimension as

(Testimony of Vernon E. Hodges.)
its sole purpose is to act as a cleaning surface and to convey the wash-water to the place where it cooperates in the final separation; and while the words "varying in length" and "increasing in length," as applied to the riffles, are employed in these claims, this language was undoubtedly directed to the actively operative ends of the riffles where the real work of the table is performed, more than to the entire riffle which, at the other end, I apprehend, might have been continued [209] indefinitely and practically without limitation, except that for the purposes of construction, workmanship, economy of space, and perhaps design, was cut off to certain proportions; and I am further confirmed in this view by reason of experiments which have been testified to, which have been made with the Wilfley table in which the lower mechanism end has been entirely cut off and thrown out of commission in the operation of the table. The language employed to define the contrasting surface from that of the riffled area, while the words "smooth, plain, and unriffled" are used in a loose description of this portion, it seems obvious that the language was employed to contrast this portion of the table with the rough portion upon which the riffles or portions performing the riffling function are located, and this view seems to be supported by the fact that a perfectly smooth or too smooth a surface would be ineffective and undesirable, as has been fully tried and tested, such, for instance, as glass, which is a good example of a smooth surface as compared with a surface of wood or lino-

(Testimony of Vernon E. Hodges.)

leum, both of which are more or less rough when compared with glass, or, in fact, a surface having shallow grooves or channels of such slight depth that they necessarily become filled with concentrates, presenting in effect a smooth, plain and unriffled area or surface—that is to say, the surface must necessarily be sufficiently rough to retain the values which are to be saved when they reach that portion of the table while at the same time it must be smooth enough to permit the lighter [210] grains of valueless material to come under the dominating influence of the wash-water and in the final separation which takes place along that portion of the surface of the table.

Therefore, I repeat, and for the reasons which I have stated, the elements set forth in the claims 1, 2, and 7 of the patent in suit are present in the Deister table as is illustrated by model, exhibit No. 6, and the drawing, exhibit No. 5.

Has investigated the subsequent art following the advent of the Wilfley table and finds some fifty subsequent patents which show a clear recognition of the Wilfley type with but slight modifications, showing clearly the combination of a roughing and cleaning plane and control of material along a diagonal line across the table. There is obviously unnecessary expanse of area on that portion of the table designated as the smooth surface A; the language of the claims of the Wilfley patent does not limit the dimensions of this smooth surface, being directed to the co-operation that takes place, due to the material being subjected to the action of the water on the smooth portion as it leaves the riffles; Exhibit 8 il-

lustrates a perfectly clear, generally triangular area at the upper concentrates end of the table over which a thin film of water is flowing, but showing that the area of this surface is unnecessarily large and wide, and that the greater portion of that area [211] of the table is non-essential and might be dispensed with; all that area between the lines marked DD and EE, on exhibit 5, drawing of Deister table, is actually physically smooth or approximately so, and that the entire surface under the water box, defined by the lines CC and EE, to all intents and purposes is smooth; Deister has reduced this area to its minimum proportions and quickly disposes of the concentrates after nothing further in the way of separation can be done with them; Wilfley might have done the same; the idea is to separate the values from the valueless, and after that has been accomplished the manner of disposition of the separated product is entirely secondary consideration; and could even eliminate the more or less sharply-sloping wash-board except as a water conveyor and would still have a smooth surface or smooth area at that end of the table; where the channels are reduced to a depth of one-thirty-second of an inch at this portion of the table it is smooth enough to permit the transverse flow of wash-water and create the final paring off and separation, and yet rough enough to permit the particles to cling and cleave with the required tenacity to maintain their position until they leave the table; Patentee Wilfley, in defining the smooth portion A of the patent, was influenced in the

(Testimony of Vernon E. Hodges.)

choice of his words by the general characteristic of the surface of the table; the term "smooth, plain and unriffled" expresses a distinction between the surface of [212] the table intended to perform a certain work as contradistinguished from another portion intended to do a different part of the work; an obstruction as narrow as these riffle cleats and as low as one thirty-second of an inch, necessarily the spaces are more or less filled with the heavier concentrates, presenting in effect a smooth, plain and unriffled surface; these ends are conveyors or guides, pure and simple, although they are so arranged that they give the appearance of being part and parcel of the riffles; physically they are riffles, but they become so low in height at this point that they no longer do the work of the riffles, but permit the free transverse flow of water to accomplish its work of final separation unhindered, presenting a surface smooth enough for this purpose and yet rough enough as the surface must be to hold the concentrates until the most favorable time for their discharge from the table; what Deister has done is to adopt the essentials or vitals of the Wilfley invention and do away with the non-essentials; if Deister improved the Wilfley table he took nothing away from the essential features of the Wilfley invention; it was not a case of subtraction, but addition and building up upon what Wilfley discloses by his invention; he omitted no function of the Wilfley table, nor did he alter the functions; Deister has steadfastly adhered to those features—the advancing terminals and an area at those terminals

(Testimony of Vernon E. Hodges.)

smooth enough to accomplish what Wilfley's so-called "smooth, plain and unriffled" surface does.

Proofs in Rebuttal.

[Testimony of Charles E. Thompson, for Plaintiff.]

[213] (Defendant's Condensed Statement.)

CHARLES E. THOMPSON

States that he is an employee of the Mine and Smelter Supply Company; that a left-hand No. 2 Deister concentrating table was received November 28, 1911, by said company and placed in its testing room; that he set up and installed said table in said testing plant and assisted in making adjustments and in operating the table on April 18, 19, and 20, 1912, when certain tests and demonstrations were made on it; that Mr. George Hodges, Mr. Vernon Hodges, Prof. Richards, Mr. Scobey, and Mr. Bunce were present during said time and that Mr. Scobey took the notes and memoranda of the said tests and measurements; that "Complainant's Exhibit No. 68 Wilfley Commercial Table" represents the deck of the Wilfley table as manufactured and constructed; that "Complainant's Exhibit No. 67 Wilfley Table deck with riffles terminating at right angles" represents a Wilfley deck with riffles of equal height terminating at right angles to the tailings discharged side.

[Testimony of Henry Eggers, for Plaintiff (Recalled).]

(Defendant's Condensed Statement.)

HENRY EGGERS, Recalled,

States that he is the same Henry Eggers who previously testified in the case; that the general construction and over all dimensions of the Deister No. 2 concentrator in the testing [214] plant of the Mine and Smelter Supply Company and the Deister tables which he had measured in the mills of the Detroit Copper Co. and the Arizona Copper Co. were just about the same.

[Testimony of Jesse Carlton Scobey, for Plaintiff.]

(Defendant's Condensed Statement.)

JESSE CARLTON SCOBEY.

States that he is vice-president of the Henry E. Wood Ore Testing Company, the business of which is that of assaying and engineering, testing ores to develop the best metallurgical treatment and report on ore treatments; that he has been connected with said character of business since 1897 or 1898; that he has had twelve years' experience in superintendence and management of concentrating plants; that he has been familiar with the Wilfley table since 1897 or 1898; that he was present on Aug. 29 to September 2, 1911, and took part in the making of tests and demonstrations on concentrating tables; that he prepared the ore that was used at the tests; that said ore was a standard mixed sulphide ore of lead, iron, zinc, and silica, which was crushed to 16 mesh and

(Testimony of Jesse Carlton Scobey.)

then screened so as to separate the different size products, one being a sand which would pass through a 16-mesh screen and be retained on a 30-mesh screen, another which would pass through a 30-mesh screen and be retained on a 60-mesh screen and a third which would pass through a 60-mesh screen; that in the first test the standard Wilfley table without riffles was operated at 244 revolutions per minute with a stroke of 5/8ths inch, the [215] table being level from end to end and having a cross slope of 3¼ inches in 4½ feet, the material being 16–30 mesh and rate of feed one ton per hour; that the feed was not regular; that "Complainant's Exhibit No. 69" is a photograph taken at the time and represents the conditions as he saw them; that the letter A on the photograph indicates the uppermost point of departure of the mineral at the concentrates discharge end of the table and the letter B indicates the point of marked separation between the mineral and silica as it is discharged from the tailings side of the table, and that between "B" and the mechanism end of the table is the silica discharge from the table; that "Complainant's Exhibit No. 70" represents a run or test on the same table represented by Exhibit No. 69, the length of stroke being now 7/16th inch, the cross slope 3½ inches in 4½ feet, the rate of feed one ton per hour and regular and even; that "Complainant's Exhibit No. 71" is the same as Exhibit No. 70 except that is shows three strings placed on the mineral as it departs from the table to indicate the line of separation of the lead, the iron and the iron zinc mid-

(Testimony of Jesse Carlton Scobey.)

dlings, that A is the band of lead, B the band of iron, C the band of zinc iron middlings and D the silica tailings; that the several lines of demarcation which the strings indicated were clearly observable on the table by the eye; that "Complainant's Exhibit No. 77" as taken of the same table at the conclusion of a test in which ½ ton per hour was fed upon the table, all adjustments being the same as at the previous test shown by [216] Exhibit No. 71; that A on the photograph indicates the lead discharging abnormally at the tailings discharge side of the table, B—the iron concentrates discharging abnormally at the tailings discharge side, C the band of iron-zinc middlings and D the silica; that where there is a change in feed the change in location of the departure of the bands of material is caused by the lack of riffling on the surface, showing that without riffles there is no control of the mineral bands; that in the operation of these tables the end inclination, the cross inclination and the stroke are constant factors, while the change in feed coming to the table is the most varying factor; that a concentrating device must control the shifting of the material due to the change in feed.

Witness states further that Exhibits No. 73 and No. 73–A represent another experiment and data thereon; that the angle of termination of the riffles is 34° 18′, whereas the angle of the standard Wilfley table is 26° 5′; that the upper riffle is much longer in Exhibit No. 73 than on the standard construction; that the feed was one half ton per hour and the upper edge of the band of lead being discharged from

(Testimony of Jesse Carlton Scobey.)
the table is 22¾ inches, the upper edge of the iron is 17¾ inches, the upper edge of the zinc is 8¼ inches and the lower edge of the zinc is 2¾ inches, and the silica is being discharged a distance of 7 feet over the tailings discharged side; that Exhibits 74 and 74–A represent [217] another test in which the feed is one ton per hour, the adjustments being the same as those of the table of Exhibit 73; that in Exhibit 74 the upper edge of the lead is 24½ inches; of the iron 11¾ inches, of the zinc 5 inches, the lower edge of the zinc 2¼ inches and the silica is discharged 9 feet, 10 inches along the tailings discharge side of the table; that the line of demarcation between the zinc and the waste in both Exhibits 73 and 74 is coincident with the riffles; that the additional one-half ton feed widens out the silica and mineral bands over that shown in Exhibit 73; that the mineral bands are probably thicker; that Exhibits 75 and 75–A represent another test with a diagram of the same; that the angle of the advancing terminals of the riffles is 26° 5′; that the upper riffle is 7 feet 3 inches long and the intermediate riffles cut off on a straight line between the terminal of the upper riffle and the point of the table, the adjustments of the table and feed being the same as shown in Exhibit No. 74; that in Exhibit 75 the line of separation is made along the line of termination of the riffles; that the tips of the riffles control or locate the line of separation; that Exhibits No. 76 and 76–A show a line of termination of riffles 30° 35′ from the tailings discharge side of the table, all other adjustments and the feed being the same as

(Testimony of Jesse Carlton Scobey.)

in Exhibit No. 74 and 75; that the line of separation between the minerals and the gangue coincides with the riffle tip termination; that [218] Exhibits 77 and 77–A show a feed of one ton per hour, stroke 7/16ths of an inch, the table was horizontally level and the transverse inclination 5⅝ inches in 4½ feet and the riffles were Z bars ¼ inch high, the angle of the tips being about 26°; that the line of separation between the minerals and gangue is coincident with the line of termination of the riffle tips.

He states further that Exhibits 78 and 78–A represent an experiment and diagram thereof, in which the riffles were of equal length, the feed was one ton per hour, the stroke ¾ths of an inch, the transverse inclination is 5¼ inches; that Exhibits 79 and 79–A represent a similar adjustment and stroke as in Exhibit 78, the feed being one-half ton per hour; that as there is no riffling surface on the last 5 feet 3 inches of the table there is nothing on that smooth surface to control the line of separation; that the riffles being all of the same length have been instrumental mainly in simply conveying the material forward and it practically brings the table in the same condition as that in Exhibits 69 and 71 where there were no riffles upon the table. Counsel here exhibits to the witness Exhibits No. 80 and witness designates on it the bands of material as they depart from the table by the letters A, B, C, and D; witness identifies Exhibit No. 77 and accompanying diagram; and finds in it the operation described in the Wilfley specification of the passage [219] of the

(Testimony of Jesse Carlton Scobey.)
material from one riffle tip to the next below, which feature of operation is not found in Exhibit No. 80 because it lacks the advancing terminals of No. 77; identifies Exhibit No. 81, and states that it shows an approach to the mode of operation of the Wilfley; identifies Exhibits 82 and 84; the conditions of operation were the same in these exhibits except the feed—83 was fed 1 ton per hour, and 82 ½ ton per hour; in 82 material is shown discharging at the tailings side of the table and in 83 partly on the concentrates end and partly on the tailings side; identifies Exhibit 84; it shows the table as it was in 83 except that ⅔ of the riffles had been removed; identifies Exhibit 85; its riffles are all 1/16th of an inch high and not tapered; identifies Exhibits 86 and 87; these were taken of the same test; in 87 there was an additional twine put on to show the location of the tips of the riffles; identifies Exhibit 88 and 88–A, which differ in the character of the material fed; identifies Exhibits 89 and 89–A; they differ from 88 in the inclination of the table and consequent different arranging of banding; identifies Exhibits 90 and 90–A; they differ from 89 and 89–A in the longitudinal grade of the table; identifies Exhibits 91 and 91–A; they differ from 90 and 90–A in the cross inclination of the table; in Exhibit 90 it is ¾ inch and in 91 it is 4½, which is the normal position of the table; identifies Exhibits 92 and 92–A; differ from 91 and 91–A in the rate of feed, being in Exhibit 91 at the [220] rate of 1 ton per hour and ½ ton in 92; identifies Exhibit 93; in this case a Wilfley was

(Testimony of Jesse Carlton Scobey.)

arranged with 1/16 inch Z bar advancing tip riffles not tapered, very light feed; identifies Exhibits 94 and 94–A; it correctly sets forth the dimensions determined by the foregoing test; identifies Exhibits 95 and 95–A; has marked with figures 1–2 the string indicating the diagonal termination of the riffle tips; there was an excess load in Exhibit 95; the same in Exhibits 96 and 96–A; this table shows the standard Wilfley deck equipped with 76 Z-bar, non-tapering riffles with material fed at ½ ton per hour; identifies Exhibits 97 and 97–A; same as Exhibit 96 except rate of feed; difference between 97 and 95 is in the material of the riffles—in Exhibit 95 wooden riffles are used, in 97 Z-bar, non-tapering riffles; identifies Exhibits 98 and 98–A; Exhibit 98 differs from 97 only in the fineness of the feed; identifies Exhibits 99 and 99–A, and marks the commencement of the points of departure from the table of the lead, iron, iron-zinc and middlings; identifies Exhibits 100 and 100–A; same as Exhibit 99; identifies Exhibit 101, it shows the location of samples; identifies Exhibit 102, it shows the assay of material fed on the table; participated in a test made on Deister concentrator No. 2; identifies Exhibits 104 and 104–A; Deister table was set up according to instructions contained in Deister catalogue; identifies Exhibits 105 and 105–A; photographs of Deister Table [221] No. 2; compares that with Exhibit 77 and finds same function main—manifested along the line A A as is shown in Exhibit 77 of the Wilfley; identifies Exhibit 106 and finds the same similarity with Exhibit

(Testimony of Jesse Carlton Scobey.)

77 of Wilfley table; identifies Exhibits 107 and 107–A, and compares 106 and 107, stating that in the case of 106 the table had the standard Deister riffling surface, in the case of 107 the riffles between the lines B B and C C had been removed; the effect of removing the riffles was to allow the bands of material to travel farther down the surface and depart at distances farther down; identifies Exhibits 108 and 108–A; Compares 107 and 108; in both cases the 1/32nd inch riffles beyond the line B B were removed, the only difference being in the transverse inclination; identifies Exhibits 109 and 109–A; and compares 108 and 109; the only difference between them is rate of feed; identifies Exhibits 110 and 110–A, this shows a Wilfley deck with riffles

In connection with the testimony of Mr. Scobey counsel for the plaintiff offered in evidence the following table of exhibits and corresponding photographs:

Exhibit No. 69 is photograph No. 1.
Exhibit No. 70 is photograph No. 2.
Exhibit No. 71 is photograph No. 3.
Exhibit No. 72 is photograph No. 4.
Exhibit No. 73 is photograph No. 5.
Exhibit No. 74 is photograph No. 6.
Exhibit No. 75 is photograph No. 7.
Exhibit No. 76 is photograph No. 8.
Exhibit No. 77 is photograph No. 9.

[222]

Exhibit No. 78 is photograph No. 10.
Exhibit No. 79 is photograph No. 11.

(Testimony of Jesse Carlton Scobey.)

Exhibit No. 80 is photograph No. 12.
Exhibit No. 81 is photograph No. 13.
Exhibit No. 82 is photograph No. 14.
Exhibit No. 83 is photograph No. 15.
Exhibit No. 84 is photograph No. 16.
Exhibit No. 85 is photograph No. 17.
Exhibit No. 86 is photograph No. 18.
Exhibit No. 87 is photograph No. 19.
Exhibit No. 88 is photograph No. 20.
Exhibit No. 89 is photograph No. 21.
Exhibit No. 90 is photograph No. 22.
Exhibit No. 91 is photograph No. 23.
Exhibit No. 92 is photograph No. 24.
Exhibit No. 93 is photograph No. 27.
Exhibit No. 94 is photograph No. 28.
Exhibit No. 95 is photograph No. 29.
Exhibit No. 96 is photograph No. 30.
Exhibit No. 97 is photograph No. 31.
Exhibit No. 98 is photograph No. 32.
Exhibit No. 99 is photograph No. 36.
Exhibit No. 100 is photograph No. 37.
Exhibit No. 101 is photograph No. 38.
Exhibit No. 104 is photograph No. 41.
Exhibit No. 105 is photograph No. 42.
Exhibit No. 106 is photograph No. 43.
Exhibit No. 107 is photograph No. 44.
Exhibit No. 108 is photograph No. 45.
Exhibit No. 109 is photograph No. 46.
Exhibit No. 110 is photograph No. 47.
Exhibit No. 111 is photograph No. 48.
Exhibit No. 112 is photograph No. 49.

(Testimony of Jesse Carlton Scobey.)

of Deister pattern; the effect of this change in the table surface was to make this Wilfley deck identical so far as possible with the Deister No. 2; identifies Exhibit 111 and 111A, and compares with 110 and 110–A; they are identical except in the rate of feed; identifies Exhibits 112 and 112–A, and compares 112 with 111, which are identical except as to the rate of feed; [223] identifies Exhibits 113 and 114.

[Testimony of Robert H. Richards, for Plaintiff (Recalled).]

(Defendant's Condensed Statement.)

ROBERT H. RICHARDS, Recalled,

Discusses the exhibits generally, pointing out specifically the cases in which there was present a control by means of the line of change of detention, which he found in Exhibits 76 and 77, but not in 78 or 84.

(Plaintiff's Condensed Statement.)

ROBERT H. RICHARDS

Says Complainant's Exhibit 69 shows the effect of treating a concentrating ore upon a smooth deck after the manner of the Rittinger table; shows the effect of irregular feed, one moment the feed coming faster, another moment the feed coming slower, and gives an idea of how utterly irregular will be the disposition of the various products, lead, iron, zinc, and silica, along the concentrates end and the tailings side of the table.

Complainant's Exhibit No. 70 shows a Wilfley table with the riffle cleats removed and therefore

after the manner of the Rittinger table, without any guide; shows that when very perfectly and evenly fed, more perfectly and more evenly than can possibly be counted upon in mill practice, it does give a beautiful separation, a perfectly even set of bands of lead, [224] iron, zinc, and silica, which can continue to be delivered along the concentrates end and the tailings side with perfect regularity so long as the feed is perfectly even as to quality and quantity and all of the other adjustments are absolutely constant.

Complainant's Exhibit 71 is identical with 70, with the one exception that the strings have been laid on to show the exact position of the dividing lines between the lead, the iron, the zinc middlings and the quartz tailing.

Complainant's Exhibit 72 should be examined in connection with Complainant's Exhibit 71, and it shows what would happen to the table if the amount of feed was changed from one ton per hour as shown in Exhibit 71, to one-half ton per hour, as shown in Exhibit 72. Here the lead concentrate in Exhibit 71 is spread far up upon the concentrates end, where the one ton per hour was fed, and it is spread back a considerable distance on the tailings side where the half ton per hour was fed, as is shown in Complainant's Exhibit 72, a half ton per hour.

Complainant's Exhibit 73, with non-taper riffle cleats 1–16 inch high, having the tips towards the concentrates end ended up on a diagonal line, which is 7 feet 3 inches back from the concentrate end at

(Testimony of Robert H. Richards.)
the feed side and is at the corner between the concentrate end and the tailings side at the other [225] end of the diagonal line. This exhibit is identical with Complainant's Exhibit 74, in all the adjustments with the one exception that Exhibit 73 is fed one-half ton per hour while Exhibit 74 is fed with one ton per hour. Comparing the two there is an extraordinary control of what is called the line of change of detention in the two figures. In 73 the line of change of detention or a line of division between the zinc middling and the quartz tailing is exactly coincident with the diagonal line of advancing terminals. In 74, where the quantity of feed has been doubled, the line of change of detention or the dividing line between the zinc middling and the quartz tailing is exactly coincident with the diagonal line of the advancing terminals of the riffle cleats. If these two figures, 73 and 74, with the diagonal advancing terminals, are looked at in connection with Exhibits 71 and 72, with the advancing terminals, it shows that in changing from 71 to 72, that is, from one ton per hour feed to one-half ton per hour feed, the table has completely changed its disposition of the products, and in Exhibits 73 and 74 that in changing from 73, one-half ton per hour, to 74, one ton per hour, the dividing line between concentrate and tailing has not been changed at all. In other words, something on this table has absolutely controlled the dividing line between the zinc middling, and the quartz tailing, and that something is the diagonal of advancing terminals.

(Testimony of Robert H. Richards.)

[226] In comparing 73 and 74, the question might be asked "What has happened to those two tables when the quantity has changed from a half ton in 73 to one ton per hour feed in 74?" The answer is that the concentrate bands have been widened from a narrower width in 73 to a wider width in 74; that the silica band has widened from a narrower width in 73 to a wider width in 74, and that in those widened bands in 74 has been disposed the extra half ton of feed.

A comparison of Exhibits 75 and 74 shows again an extremely instructive illustration of the very perfect mechanical control of this line of change of detention by the advancing terminals along the diagonal of these riffle cleats. In 74 the upper cleat is cut off 7 feet 3 inches from the concentrates end while the lower cleat goes to the end, and the diagonal runs from the upper to the lower, which is a straight line. In 75 the upper cleat is cut back 10 feet 4½ inches from the concentrates end while the lower cleat goes to the concentrates end, and the diagonal line runs from the end of the upper cleat to the end of the lower, which is a straight line. In comparing these two, 74 fed with one ton per hour, having a steeper diagonal, making an angle of 34 degrees and 15 minutes with the tailing side, and 75, with the gentler slope of diagonal line, making an angle of 25 degrees and 5 minutes with [227] the tailings side, the feed one ton per hour has practically just as perfect control in 75 as in 74. The only difference in the two photographs is that, owing to the gentler

slope of 75, the zinc middling has gone slightly back of the line of terminals, perhaps an inch or two, whereas in 74, with the wider angle, this line of division is exactly on the terminals, showing a remarkable control by mechanical means of the line of change of detention by means of their diagonal termination of the riffle cleats.

Complainant's Exhibit 76 shows an arrangement of riffle cleats in which the upper cleat is cut back 10 feet 4½ inches from the concentrate end, while the lower riffle cleat is cut back a distance of 24 inches from the concentrate end, and the diagonal line of terminals runs from the end of the upper cleat to the end of the lower cleat on a straight line. This again shows a perfect control entirely irrespective of the corner of the table of the line of change of detention between the zinc middling and the quartz tailings along the diagonal of the advancing terminals.

Complainant's Exhibit 77 shows a complete change of riffle cleats. Here the Z-bar cleat ¼ inch high was used, which has been supposed by some commentators to be what was meant by the Wilfley patent, but there is no statement [228] whatever in the patent which says that it should be ¼ inch high. On account of the extreme height of this riffle cleat, namely, ¼ inch, and the coarseness of the sand that was being fed, 16–30 mesh, it was necessary to give this table a greater slope than is usually given to a Wilfley table, in order to produce the regular Wilfley action, namely, the mechanical control of

(Testimony of Robert H. Richards.)

the line of change of detention along the line of advancing terminals on a diagonal line, and this figure shows such a control very perfectly accomplished.

Complainant's Exhibit No. 78 shows a Wilfley deck supplied with riffle cleats ¼ inch square, of uniform height throughout their length, and cut back from the concentrate end 5 feet 3 inches all the way from the feed side of the table to the tailings side of the table. In other words, the diagonal is entirely wanting.

Comparing Complainant's Exhibit No. 78 with Complainant's Exhibit No. 77, there is in Exhibit 77 a complete and perfect control of the line of change of detention, which fixes the position of departure from the concentrate end and the tailings side of the various bands of mineral and tailing. In Exhibit 78 the feed is held in the four upper riffles almost completely, a little has drifted over to the fifth, and [229] then the sands are delivered on to the smooth part of the table without any controlling support of a diagonal formed by the advancing terminals of the riffle cleats.

In order to see the effect of this lack of support or lack of mechanical control, Exhibit 78 must be compared with Exhibit 79, Exhibit 78 having one ton per hour feed, all of the other adjustments being identical in the two cases. This comparison shows that the upper line of the lead concentrate in 78, with one ton per hour feed, is 31 inches up from the corner on the concentrate end; that the upper line of the lead in 78, with half a ton per hour feed, is only 21 inches

(Testimony of Robert H. Richards.)

up from the corner of the table; that the silica extends back in 78, 4 feet 6 inches, where the one ton per hour feed is given, while it only extends back 4 feet from the corner on the tailings side where the half ton per hour feed is given. But a fact of far more importance is that in 78 the line of demarcation between the zinc middling and the silica tailings comes out exactly at the corner of the table, whereas in 79 this line of division or demarcation between the zinc middling and the quartz tailing comes out 10¾ inches back along the tailings side from the corner. This shows a variation of ten inches, due to the change in feed from one ton per hour to one-half ton per hour, all the other adjustments being constant.

[230] It also shows that part of the material that would be coming from the concentrates discharge end in the first two exhibits would be coming from the tailings side in the other.

A comparison of Exhibit 77 with Exhibit 80 shows that in 77, with the diagonal of advancing terminals to control the line of division between the zinc middling and the quartz tailing, the line is perfectly controlled and comes out as desired at the corner of the table, Exhibit 80 differing from that only in the fact that the riffle cleats here are ¼ inch square of wood instead of being Z-bar riffles, but in both cases the riffle cleats are ¼ inch high throughout their entire length, 77 having a diagonal and 80 having the tips cut off square at 5 feet 3 inches back from the concentrate end; the distinction being that the perfect control as shown on 77 throws the concentrate on

to the concentrate side and the tailing on the tailing side as desired, while on 80 the products are all thrown onto the tailing side. The line of demarcation between the zinc middling and the silica is 31½ inches back from the corner of the table.

Complainant's Exhibit 81 represents a Wilfley deck having riffle cleats tapered in thickness as they are all made for the commercial Wilfley table, but ended up on a line that is 6 feet one-half from the concentrate end and parallel [231] to the concentrates end. The line of these terminals, therefore, has no diagonal at all for the control of the line of change of detention.

A comparison of 80 with 81—80 where the riffle cleats are ¼ inch thick throughout their entire length, 81 where the riffle cleats taper to a thin edge at the concentrate end of the cleat—shows that the effect of this taper has been simply to allow the bands of silica, zinc middling, iron and lead concentrate to be moved backward along the tailings side to a considerable greater degree than they were located where the riffle ¼ inch thick extended out to the tip.

Looking at Exhibits 82 and 83 the same riffle cleats appear as shown in Exhibit 81, namely, taper riffle cleats ended upon a line parallel to the concentrate end and 6 feet and ½ inch back from the concentrate end. These two tests are directly comparable as illustrating the lack of control of this arrangement of riffle cleats; 83 has one ton per hour fed to it; 82 has one-half ton per hour fed to it, all the other adjustments are identical.

(Testimony of Robert H. Richards.)

Looking for the line of division between the zinc middling and the quartz tailing, it will be seen on 82, with the lesser feed, that this line is 3 feet 4¾ inches back from the corner of the table on the tailings side; that it is, with the [232] larger feed, one ton per hour, in Exhibit 83, two feet 11¾ inches back from the corner, making a change of 5 inches, it varied 5 inches by the variation in the feed, showing that there is little or no control here, even with the taper riffle cleats, of the position of that line of demarcation between the zinc middling and the quartz tailing, showing with this form having no diagonal line of advancing terminals the mechanical control is wanting.

And that, therefore, the mere tapering of the riffle in and of itself does not serve to control the line of separation.

In Exhibit 84 those same taper riffle cleats are on the table except that two-thirds of them have been removed. The lower cleat is left on, the next two are taken out, the fourth is left on and the fifth and sixth are taken off, and so on all the way up the table from the tailings side. This gives, with one ton feed, Exhibit 84, almost the same result as was given in Exhibit 83, where the complete number of riffle cleats was present. The distance back of the line of separation between the zinc middling and silica tailing in 83, with the complete number of riffle cleats, is 2 feet 11¾ inches. The distance back to the line of division between the zinc middling and the quartz tailing in 84, with only one-third the number of riffle cleats,

(Testimony of Robert H. Richards.)

is 3 feet and ¾ of an inch, a difference of only 1 inch, showing that the fewer riffle cleats do not hold up the [233] starting of the bands quite as much as the larger number.

An interesting comparison can be made between 78, having 13 riffle cleats ¼ inch square throughout their entire length, and 84, having taper riffle cleats. In 78 the riffle cleats are cut back 5 feet 3 inches from the concentrate end, and the terminals end upon a line parallel to that. In 84 the riffle cleats terminate with their thin edge 6 feet and ½ inch from the concentrate end on a line parallel to the concentrate end. Here the thicker tips show their ability to push the starting point of concentration far forward beyond the tip of the upper riffle cleats, whereas in 84, where the taper riffle cleats are used, the concentration started somewhat back in the thin taper riffle cleats. But there is no indication of the slightest control of the line of change of detention in either of these cases.

Complainant's Exhibit 91 has standard Wilfley taper riffle cleats mounted with the standard diagonal line terminating at the corner of the table between the concentrates end and the tailing side. This was fed at the rate of 2,000 pounds or one ton per hour.

Complainant's Exhibit 92 is in all respects the same as 91, with the one exception that it is fed with one-half ton per hour in place of one ton per hour. In 91, with one ton per hour, the line of division between the zinc middling and the [234] silica tail-

ing is coincident with the diagonal of the termination of the tips of the riffle cleats, and in 92, with one-half ton feed, the line of division between the zinc and middling and the silica tailing is along the line of the tips of the riffle cleats on the diagonal. The extra tonnage on 91, where one ton per hour was fed, over the half-ton shown in Exhibit 92, is disposed upon the table in the form of wider bands of the concentrate on the concentrate end and the silica tailing on the tailing side. In 91, with one ton feed, the concentrate is up 17 inches from the corner to the top line of the lead, in 92, where only a half ton feed is given, it is up 13–⅜ inches above the corner to the upper line of the lead. In 91, with one ton per hour feed, the silica band runs back four feet three inches from the corner; on 92, with one-half ton feed, it runs back only 34–½ inches from the corner.

Figure 93 is a photograph without the blue-print, and it shows the supporting effect which the riffle cleats have when terminated in a diagonal line covered by the Wilfley patent upon the sand when fed with a very small amount of sands. The whole of the sand here, whether lead, oron, zinc or silica, is supported beyond the tips of the riffle cleats, leaving a little space between the tips and the bands. By increasing this feed those bands drop right into their normal place, with [235] the line of division between the silica tailing and the zinc middling along the line of the tips.

Complainant's Exhibit 96 shows the regular Wilfley deck mounted with Z–bar riffles 1/16 inch high,

(Testimony of Robert H. Richards.)

non-taper. Here the table is fed with one-half ton per hour and the line of division between the zinc and middling and the silica tailing runs down 5 inches from the corner along the tailing side, the line of division being a little below the line of the tips.

In Complainant's Exhibit 97 the table is identical with 96, using the same Z–bar riffles with diagonal tips along the usual line adopted in the Wilfley commercial tables, and this is fed by 2,000 pounds or one ton per hour. Here the line of division between the zinc middling and the silica tailing is nine and one-half inches below the diagonal. In this pair of photographs representing the two tests it is quite evident that the table was given a little too steep an inclination for the diagonal to hold the line of division right upon the tips. If there had been a little less transverse slope both of these lines would have gone right to the tips, as in the other cases. Here, as in other cases, is shown the disposition of the increased tonnage in 97, fed with one ton per hour, as compared with 96, fed with one-half ton per hour, for the silica band in 97 has spread out 7 feet 8 inches from the corner, whereas in 96 [236] the silica band only runs up 31 inches along the tailing side from the corner. Likewise, the concentrates bands in 97, with one ton per hour, are spread up 25½ inches on the concentrate end above the corner, whereas in 96, with only one-half ton feed, the concentrate is spread up 21¼ inches above the corner.

With respect to the mechanical control of the riffle tips the function is identical then whether you use

(Testimony of Robert H. Richards.)
the rectangular wood riffles 1/16 of an inch high, or the tapering riffles tapering to 1.32 of an inch, or use the Z-bar riffles 1.16 inch high or uniform height, so that the shape or taper of the riffle makes no difference with reference to the performance of the function.

Complainant's Exhibit 104 represents a Deister table fed with 500 pounds per hour. Here the line of control between the zinc middling and the quartz tailing is practically co-incident with the second step-off marked BB on blue print. Complainant's Exhibit 105 represents a Deister table fed with 1,000 pounds per hour (with transverse slope increased).

This increase of slope has pushed the line of division between the quartz tailing and the zinc middling down to the first step-off marked AA on the blueprint, and the string on the photograph is practically coincident from end to end with that line of the first step-off on the riffle cleats.

[237] Complainant's Exhibit 106 has the same slope as Complainant's Exhibit 105, but it is fed with only half the amount of ore, namely, 500 pounds per hour. This appears not to have moved the line of division between the zinc middling and the silica tailing to any appreciable extent. The line on this one is slightly above what it is on Complainant's Exhibit 105, with the larger tonnage, but the amount is only 0.18 of a foot. In 105, with 1000 pounds per hour feed, the line of demarcation between the zinc middling and the quartz tailing is exactly upon the first step-off AA. In 106, where the table was fed with

(Testimony of Robert H. Richards.)

500 pounds per hour, all other adjustments being the same, it is slightly, 19/100 of a foot, in advance of that line, or about two inches.

Complainant's Exhibit 108 represents a changed condition in the Deister table. The thin tips between the line BB and the concentrate end have been removed and the table was run without those tips. The quantity of feed here is 500 pounds per hour and the line of division between the zinc middling and the silica tailing is directly along the second step-off marked BB on the photograph and on the blue print. It is the line of the advancing tips as made after removing those extra parts between BB and CC of the riffle cleats.

A comparison of Complainant's Exhibit 108 with Complainant's Exhibit 104 shows that with the same feed, 500 pounds per [238] hour, but with a slightly different grade, 104 having 31/32 drop in two feet, while 108 has 1–3/32, that is to say, a difference of 4/32 inch in two feet, the line of demarcation between the zinc middling and the silica tailing in the two photographs is practically the same thing, namely, it is along the line BB in both cases—in Exhibit 104, where the extra parts of the riffle cleats are present between the line BB and CC, and in Exhibit 108 where that extra portion of the riffle cleats between BB and CC has been removed. There is a slight difference in the disposition of the bands due to removing those extra portions of the cleats between BB and CC.

In 104, where the extra cleats are present, the lead

(Testimony of Robert H. Richards.)

nearly all comes out of the first discharge hole on the concentrate end. In 108, where those cleats have been removed, the lead band comes out through the first three holes for the discharge of concentrates on the concentrate end. The iron on 104, with the extra parts of the riffle cleats on, goes out through the holes Nos. 2 to 12 on the concentrate end; in 108, where the extra parts of the riffle cleats have been removed, the iron goes out through the holes No. 4 to No. 14 on the concentrate end.

The step-offs along the line AA and BB on the Deister construction have the ability, as disclosed by these exhibits, to control the diagonal line at the upper end of the diagonal [239] line so as to carry it forward at the upper end at an angle which would advance it somewhat further forward even than is shown in Exhibit No. 74, which is an illustration of the carrying forward of the bands somewhat in advance of the normal Wilfley construction, those step-offs have the ability to carry that line even forward on the larger angle, owing to the amount of their ability to control.

Complainant's Exhibit 109 is fed with a very small rate of feed, 167 pounds per hour, and it is comparable with Complainant's Exhibit 108, and especially interesting as exhibiting the ability of the step-off BB to control the line of division for in 108, fed with 500 pounds per hour, the dividing line between the zinc middling and the quartz is exactly upon the diagonal step-off BB from end to end, and in Exhibit 109, fed with only 167 pounds per hour, the line of

(Testimony of Robert H. Richards.)

division between the zinc middling and the silica tailing is coincident with the terminals of the riffled cleats, called the step-off BB, the only exception being at the very lower end where for three or four inches the dividing line springs back towards the silica a little, due to the fact of the removal of a segment of the riffle at that point.

Complainant's Exhibit 110 represents a normal Wilfley Table deck supplied with a set of Deister riffle cleats, made of the same thickness as on the Deister table, with the same [240] three step-offs as on the Deister table, differing in the fact that the large dams, of which there are four, dividing the table into four compartments, extend back to the mechanism end in order to maintain the water level so that the Deister table action may be completely reproduced.

Complainant's Exhibit No. 111 represents the same Wilfley deck with the same Deister riffle cleats upon it, disposed at the same angle, so far as the line of diagonal termination is concerned, as obtains on the Deister table. There appears to be two variables here. The feed in exhibit 110 is 1,000 pounds per hour and the slope transverse to the riffle cleats is 1–3/32 inches in two feet. On this test the line of division between the zinc middling and the silica tailing was along the step-off AA with the exception that a little of the silica ran over the line in places, particularly at a distance three-fourths of the way down from the feed side toward the tailing side. In exhibit 111 the feed was 500

pounds per hour instead of 1,000, and the slope was three-fourths of an inch in two feet transversely to the riffle cleats; and in this case the line of demarcation between the zinc middling and the silica tailing is directly along the line of the second step-off BB, the change from AA to BB being due to the less slope.

In Complainant's Exhibit 112 the conditions were identically **[241]** the same as in 111, with one exception, that the feed which was 500 pounds in 111 was 167 pounds per hour in 112. The line of division between the zinc middling and the silica tailing here was coincident with the second step-off BB in exhibit 112, with the lesser feed, exactly the same as it was in 111 with the greater feed. The quantity of feed was so small that it is a little difficult to see it upon the photograph, the riffle cleats standing up uncovered by sand all the way from the feed side to the tailing side, but a careful examination of this in the run convinced witness that it represented the line of demarcation, namely, the second step-off BB, the line of demarcation between the zinc and the silica.

Referring to the functions described in the specification of the Wilfley patent in suit and to the photograph, exhibit No. 77, illustrating the patent construction in operation, says that the exhibit illustrates the function described in the specification commencing on next to last line on page 1, and concluding on line 56, page 2; shows the gangue with streaks of mineral contained therein passing

(Testimony of Robert H. Richards.)

from advancing riffle tip to advancing riffle tip below, progressively, down the ends of diagonal riffles; that exhibits 105 and 106 of the Deister table in operation both disclose that action on the line AA or the first diagonal line of step-offs; during **[242]** the time tests were being made, which are illustrated in these photographs, this action was very apparent to the eye along the line indicated in these photographs. Line of control in the construction of the Wilfley patent is present as a function, not as a mere theory, but a matter of fact. There isn't any line of mechanical control of the change of detention present in the Blatchly and Kustel construction; no function of mechanical control, nor repeated washing disclosed in the Lampert patent, as described in the Wilfley patent in suit; does not know of anything in the prior art disclosed in this case that teaches the functions of the invention of Wilfley other than disclosed by Wilfley patent itself; the same enrichment of material takes place as it progresses from ends of riffle tips to concentrates discharge end on the smooth linoleum surface of the Wilfley table, as testified to by Witness Kiddie for defendant, with respect to the Deister table, between lines BB and CC, or the end of the table.

[Testimony of Walter H. Bunce, for ~~Defendant~~ Plaintiff.]

[243] (Defendant's Condensed Statement.)

WALTER H. BUNCE

States that he is a consulting engineer by profession, living at Hartford, Conn.; is familiar with

(Testimony of Walter H. Bunce.)

the Wilfley table; agrees with Dr. Richards as to the automatic control of the line of change of detention of material on the surface of that table.

(Plaintiff's Condensed Statement.)

WALTER H. BUNCE.

Was present when tests were made on the Deister table in testing plant of complainant and closely observed adjustments and operations of Wilfley table deck with riffles of the Deister type placed upon the surface; assisted Witness Scobey in taking measurements of the tests and believed the notes accurate and records made and observed; comparing exhibit No. 77 with Exhibits Nos. 105 and 106, the latter show the functions illustrated in the former—the repeated washing of material described in the specification of the Wilfley patent; in his observation of the Deister table in operation the condition and performance of the function illustrated in Exhibit No. 77 appeared very clearly; in Exhibits 107 and 108 of the Deister table, with thin riffles removed between lines BB and CC, the function referred to continued to be performed by end of riffles terminating on the line BB; the thin riffles between lines BB and CC seem to serve as guides for conveyors; on Deister tables in tests referred to mineral bed became separated from gangue on the line BB, passed forward, and wash-water flowed over it; there might have been traces of silica, but not in material quantities; the concentrate as it moved out on the portion of the table

(Testimony of Walter H. Bunce.)

covered with these riffles would be called a finished product.

[Testimony of Vernon E. Hodges, for Plaintiff (Recalled).]

[244] (Defendant's Condensed Statement.)

VERNON E. HODGES, recalled,

States that since his former deposition he has seen the Deister table; adheres to his former statement that concentration on that table is complete at the line BB; he might have said *commercially complete;* states that the Wilfley patent means that one part of the table is riffled and the other *smooth enough, plain enough,* or *unriffled enough* to cooperate with the riffles of unequal length, which means unequal in length as to the terminals to accomplish the functions required of the Wilfley patent, which functions he finds performed in the same manner on the Deister table as illustrated in Exhibits 106 and 107; has seen demonstrations made on Blatchly and Kustel construction; difference between it and the Wilfley is that its riffles all terminate on a line at right angles to the central longitudinal axis or direction of motion without the advance at the terminals, so that no provision was made for catching and retreating.

(Plaintiff's Condensed Statement.)

VERNON E. HODGES

States that Wilfley was a leader; his invention was emphatically an advanced stride in the art of ore concentration; that all the art that can be discovered, which is in anywise similar to Mr. Wilfley's

(Testimony of Vernon E. Hodges.)

construction has originated since **[245]** the Wilfley patent—none before it, would seem a satisfactory reason for position that Wilfley made a radical departure from his predecessors in the art; the Rittinger surface referred to by defendant's witness Browne does not show a construction having any means of control—only has a plain surface; Blachly and Kustel don't have the Wilfley invention, nor does Lampert; neither have any provisions whereby the function of repeated catching and re-washing of material is possible; Wilfley was the first to do this; Wilfley does not claim to have invented a smooth surface per se, a riffled surface per se, nor a combination of riffled and smooth surface per se, but what he has disclosed and claimed and what is required in the process and apparatus, as outlined and set forth in his patent, is a co-action of two surfaces which together produce the function of the patent, namely, the re-treatment and re-washing as the material reaches out beyond the end of one riffle cleat and finds beneath another ready to catch it and admit of its re-treatment until the operation is completed and altogether effective: Wilfley first accomplished in his invention and patent this primary function and devised the instrumentalities for accomplishing it; in claiming this invention nothing is said, and there are no limitations as to **[246]** the length of riffles, size of parts and triangular shape of one of the surfaces, the degree of roughness or smoothness; these features while contributing to the general result, are not minutely

(Testimony of Vernon E. Hodges.)

specified, nor is the Wilfley patent limited to the non-essentials which defendant's witness Browne seems to emphasize, discussed the file wrapper and contents of the Wilfley patent, in conjunction with the testimony of defendant's witness Browne, and in witness' opinion so far as the essence of the Wilfley invention is concerned, as disclosed in his patent, nothing was done by the patent examiners which in any way restricts or limits him as to the essence of his invention and the citation of the Blatchly and Kustel patent did not narrow or restrict Wilfley in the scope of his invention as understood by witness.

[Defendant's Record Condensed and Simplified.]

[247] *In the District Court of the United States for the District of Arizona.*

Nos. 11 and 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant,

and

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

THE DEFENDANT'S RECORD CONDENSED AND SIMPLIFIED IN COMPLIANCE WITH PARAGRAPH (b) OF RULE 75 OF THE EQUITY RULES.

[248] *In the District Court of the United States for the District of Arizona.*

Nos. 11 and 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant,

and

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant,

Summary of Evidence.

The above-named cases are in effect one; the same

proofs apply to them, all contained in one record, and taken under an agreement that the same proofs should apply to both cases; and the following summary of the evidence made in obedience to rule 75 of the Equity rules is to stand for both cases alike.

[Testimony of Norman Carmichael.]

[249] NORMAN CARMICHAEL

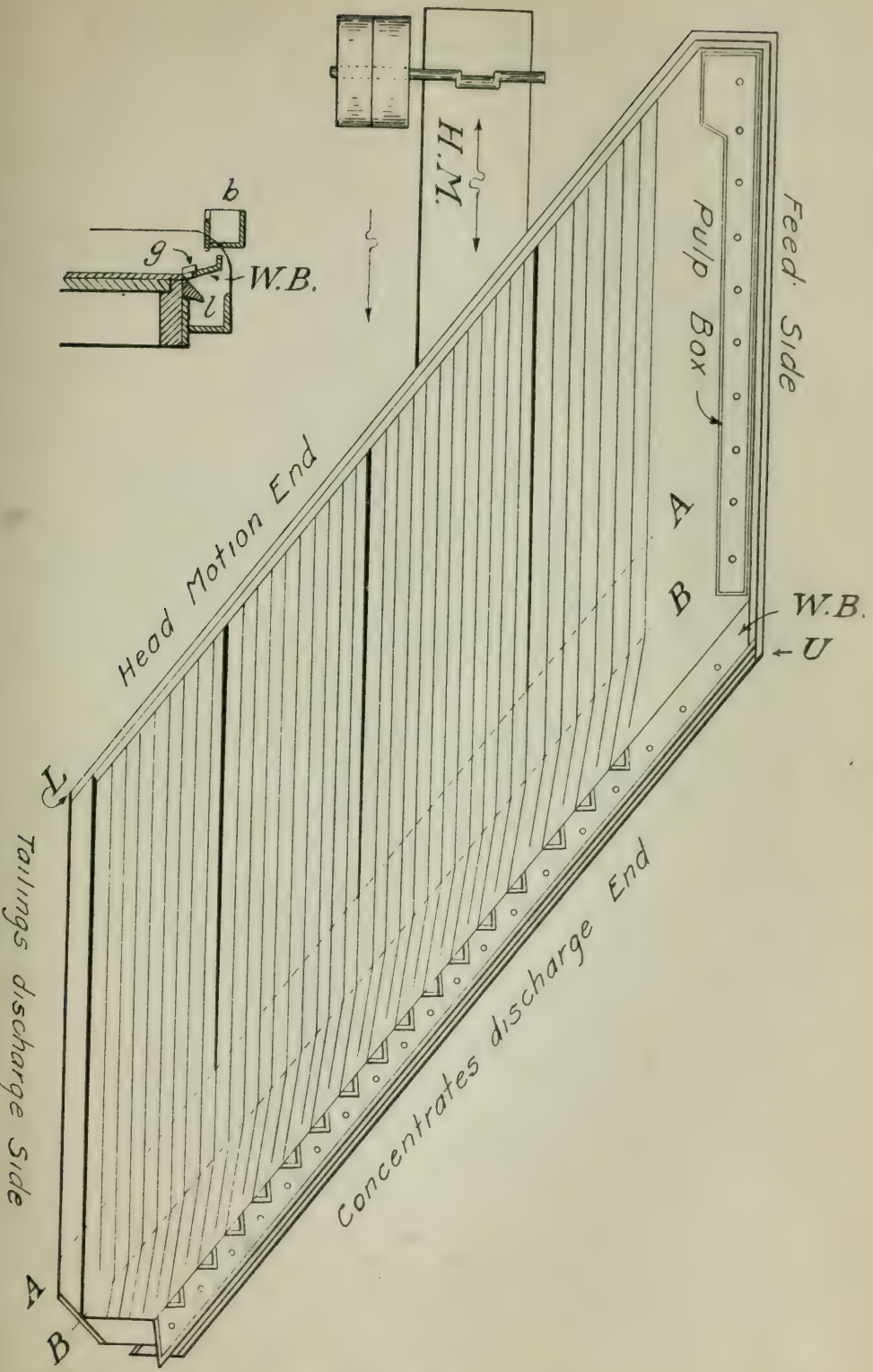
Stated that he was general manager of the Arizona Copper Company; that in the process of mining as carried on by that company the ore was first broken down and the richest pieces sent direct to the smelter; the residue was crushed again and treated on jigs; then ground in Huntington mills; then passed through a classifier, from which the first product is treated on Wilfley tables and the second on Deister tables and the third on vanners; and that about 38% of the copper recovered from the ore is reclaimed in the form of concentrates from the tables and vanners.

On cross-examination he stated that the minerals occur in veins or streaks in the rock known as monzonite porphyry; the concentrates are about 16% copper; 22 to 25% iron, and 26 to 28% sulphur.

[Testimony of John Kiddie.]

JOHN KIDDIE

States that he is mine and mill sampler and chief assayer for the Arizona Copper Company; that the company has in use Deister tables and Wilfley tables, with the operation of both of which he was familiar. At this point counsel put in the hands of the witness a drawing which at the conclusion of his examination in chief was put in evidence, marked, "Defendant's Exhibit Deister Table Drawing."



THE DEISTER TABLE.

Defendant's Exhibit Deister Table Drawing.

[Endorsed]: Mine and Smelter Supply Co. vs. Arizona Copper Co. Defendant's Exhibit Deister Table Drawing. J. O. Thomson, Special Examiner. Filed Nov. 19, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Deister Table Drawing. Received Jul. 26, 1913. F. D. Monckton, Clerk.

(Testimony of John Kiddie.)

[249¼] Q. I will now put in your hands a drawing which is intended to show a top view of one of your Deister concentrating tables. In this drawing the feed side and tailings discharge side, and head motion end and concentrates discharge end, are indicated in words. There is shown, on the feed side, a pulp box, with perforations in the bottom of it, by which pulp is delivered upon the surface of the table. At the head motion end there is shown a pulley and indicated a shaft marked H. M. On the surface of the table are shown a number of riffles extending from the head motion end of the table to the concentrates discharge end. Four of those riffles, indicated by heavy lines, are higher than the others, and taper from the base toward the tip to the dotted line A A. The riffles between the high riffles are of uniform height from their base to the dotted line A A, except those in the upper group between the pulp box and the first high riffle. The riffles of that group are a little higher than those of the groups below, and a little further apart. At the line A A the riffles are all of the same height. Between the lines A A and B B the riffles are little lower than those above, and all of the same height. Between the line B B and the terminals of the riffles they are all of the same height, and lower than those in the zone between the lines A A and B B. The edge of the table proper is along the line C C. Adjoining [249½] that line, and fitted up snugly to the edge of the table, is a wash-water board W B, which is indicated by those letters at the two ends of the board. This is a plain board

(Testimony of John Kiddie.)

fitted snugly against the edge of the table, and having a sharp slope toward that edge. A number of perforations are made in the edge of that board close to the edge of the table. These perforations open down into a box underneath for the reception of the concentrates produced in the operation of the table. Above each of these perforations is a little raised triangular guard to prevent water flowing down the board from flowing into the perforations. The riffles alternately extend to the edge of the table and stop off a couple of inches back from the edge. Each one of the riffles which extends to the edge of the table, registers with one of these openings, so that the concentrates coming down the riffle trough, above the riffle, are delivered into the opening. There is, fixed above this wash-board a water box not shown in the main drawing, but shown in cross-section above. In this little drawing, b indicates the water box; W B the wash-board. The water box has notches in it, of which one is shown, from which water runs out and falls in small streams on the surface of the wash-board. The points where these [249¾] little streams fall on the wash-board are indicated by small circles in the main drawing.

In use, the table is so placed that the corner marked U is the highest point on the table, and there is a descent from that point across the riffles, substantially at right angles to them, over the whole surface of the table. The concentrates discharge end is also elevated slightly—something like three-quarters of an inch above the head motion end. In operation the

(Testimony of John Kiddie.)

head motion imparts to the table a to-and-fro oscillation of such character as to cause the material on its surface to tend to travel along the riffle troughs towards the concentrates discharge end. The water box is kept supplied with water which, falling in gentle streams on the wash-water board, keeps its surface covered with a quiet film of water, flowing down over the edge of the board, flows down across the riffles, substantially at right angles to their direction, to the tailings discharge. The water flowing down from the wash-water board, meets the material under treatment as it advances towards the concentrates discharge end, and washes back from the edge any grains of sand that might tend to go into the concentrates discharge openings. After [250] consideration of this drawing, you may state whether or no it represents, with substantial accuracy, the Deister concentrator tables in use in the works of the defendant.

A. I could say that I know that this is substantially a correct representation of the Deister table that we use.

The witness then takes up certain statements made by Vernon E. Hodges, expert for the plaintiff, in which he (Hodges) stated in testifying about the Deister table in reference to the spaces between the line BB and the edge of the table occupied by the low riffles 1/32nd of an inch high, that he did not admit that those portions contributed to concentration, that separation was not going on in those shallow channels, that it was complete before the material reached

(Testimony of John Kiddie.)

those channels, and in answer to these statements of Mr. Hodges Mr. Kiddie stated that he had many times observed the operation of the Deister table and observed that fine grains of sand were being washed over the low riffles practically all the time from the line BB to the concentrates discharge edge; that at that stage of concentration the finest grains of sand remained to be removed and were removed by the water washing the sand over the low riffles and the motion of the table propelling the concentrates forward to the discharge. The witness stated that he made some tests to show whether or not concentration was going on between the shallow riffles and described one of those tests. He said he made two small, thin scoops [251] to fit between two of the riffles, with their edges filed sharp. Those scoops were placed between two riffles with their sharp edges pointed toward the mechanism end, one near each end of the riffles and two jets of water were provided arranged with rubber tubing and glass tips, and with those jets the concentrates between the riffles and extending some distance ahead of the scoop were washed into the scoop and caught; those two samples were taken simultaneously; the scoops were made to fit closely in the space between the riffles; the two samples were taken at a time when the table was in normal and regular operation; the taking of a sample took only a fraction of a minute; he made a memorandum of the tests made by him in writing, which is in evidence; in explanation of the memorandum he stated that under each of the headings "Scoop A"

(Testimony of John Kiddie.)

and "Scoop B" there was a column headed % Cu. and one headed % ins., which mean per cent copper and per cent insoluble; the insoluble is that portion of the sample that is not soluble; in nitric and hydrocholoric acid; that, for example, the figures in line 1 under scoop A signify that of the sample taken out 12.44 per cent by weight, dried, was copper, and 59.26 per cent by weight was insoluble material, mostly silica.

[Testimony of Gilbert H. Davidson.]

GILBERT H. DAVIDSON

States that is is head carpenter in the works of the Arizona Copper Company; has seen sand with the naked eye passing over the low riffles on the Deister table; that both concentrates and sand [252] can be seen passing over.

[Testimony of W. A. Moore.]

W. A. MOORE

States that he is mill superintendent for the Arizona Copper Company; the process of concentration is not complete when the material crosses the line of the second step down in the riffles on the Deister table; you can see concentrates and sand passing over the riffles in that part of the table; the sand is very fine and is light colored.

[Testimony of Rudolph Gahl.]

RUDOLPH GAHL

States that he is in charge of experimental work for the Detroit Copper Mining Company; is familiar with the Deister concentrators in use by that com-

(Testimony of Rudolph Gahl.)

pany; in a normal running table the concentration of the material which passes the second stepdown is not complete at that point; some sand remains to be taken out; it can be seen passing over the low riffles. Counsel exhibits to witness a drawing marked "Defendant's Exhibit Drawing of Deister Table and Record of Tests of its Output"; witness states that these tests were made under his direction; the concentrates were taken off in his presence from one of the Deister tables in the regular operation in the works of the Detroit Copper Mining Company; the table was running in its ordinary and normal manner; the samples were dried, weighed and assayed; the assaying was done at the smelter assay office of the Detroit Copper Mining Company.

[Testimony of George Nord.]

[253] GEORGE NORD

States that he is in the employ of the Detroit Copper Company; the concentration of material on the Deister table is not complete until it comes to the end where the concentrates go into the concentrates box; when the table is in operation sand can be seen passing over the thin riffles.

[Testimony of Earle Schuyler.]

EARLE SCHUYLER

States that he is millman in the employ of the Detroit Copper Mining Company of Arizona; is familiar with Deister table No. 2 and had noticed the part occupied by the very thin riffles; that silica washes over those riffles; can see it when the table is in its regular and normal operation.

[Testimony of Gustavus E. Hunt.]

GUSTAVUS E. HUNT

States that he is superintendent of the concentrator of the Detroit Copper Mining Company; is familiar with the Deister concentrator No. 2; has noticed the action taking place between the thin riffles on that table; there is a continuous concentration taking place there all the time; the silica or sand can be seen with the naked eye passing over those low riffles; 38 Wilfley tables are used in the Detroit Copper concentrators; has had opportunity to compare the Wilfley and Deister tables at work; produces drawings of the standard Wilfley table and Deister No. 2 [254] marked "Defendant's Exhibit Dimensions of Wilfley Table" and "Defendant's Exhibit Dimensions of Deister Table"; the standard established weights of the tables are about 1800 lbs. crated for the Wilfley table and 1500 lbs. crated for Deister; would make no distinction between the tables as to amount of work, give them the same load each; it has sometimes happened that the thin riffles on the Deister table have worn down so that the concentrates would tend to flow down to the tailings discharge; have tried the experiment of putting riffles on the Deister table 1/16th of an inch high between the line BB and the concentrates discharge for the treatment of coarser material, and for that kind of material it proved to be an advantage.

[Testimony of John Kiddie (Recalled).]

JOHN KIDDIE, Recalled,

States that in January, 1909, he made a comparative test of a Wilfley and Deister machine; it was

(Testimony of John Kiddie.)

done under the direction of Mr. Carmichael, the general manager of the Arizona Copper Company; that a Deister and a Wilfley table were set up and were run on a feed which was divided by an automatic device equally to the two machines; concentrates from each machine were saved for the run, and dried, weighed and sampled; and during each run the tailings and feed were sampled at regular intervals; from this data the relative efficiencies were figured; the test extended over 12 days and the average was about two hours per day; we assayed samples of the products, and also of the tailings; all the [255] facts of the tests were tabulated; produces the record marked "Defendant's Exhibit Record of Comparative Tests of Wilfley and Deister Ore Concentrators."

[Testimony of Ellis W. Honeyman.]

ELLIS W. HONEYMAN

States that he was chief chemist of the smelter of the Detroit Copper Mining Company at Morenci, Arizona; he regularly receives samples from Dr. Gahl; produced a blue-print marked "Defendant's Exhibit Drawing of Deister Tables and Record of Tests of Its Output," containing a drawing of the table and a tabulation referring to a series of samples and containing a record of those samples, which samples pass through his hands; made a record of the assays which he has compared with the table and which is correct.

[Testimony of Arthur S. Browne.]

ARTHUR S. BROWNE.

Preliminary to his deposition counsel for the defendants put in evidence a certified copy of the filewrapper and contents of the Wilfley patent in suit, and the same was marked for identification "Defendant's Exhibit Certified Copy of Filewrapper and Contents of the Patent in Suit."

Witness then states that he is a patent solicitor and expert residing at Washington, D. C.; he has seen the Wilfley table in operation, and also the Deister table in use at Morenci, Arizona; in his opinion the Deister table does not have the elements of claims 1, 2 and 7 of the Wilfley patent; [256] discusses the von Rittinger table, the patent to Blatchly and Kustel No. 258,879, June 6, 1882, and Lampert No. 533,362, Jan. 29, 1895; discusses the deposition of Vernon E. Hodges, expert for the plaintiff; enumerates his four theories to the effect (1) that that portion of the Deister table having riffles only 1/32d of an inch high constitutes a smooth, plain, or unriffled surface as called for by claims 1, 2, and 7 of the Wilfley patent, that when Wilfley refers to one portion of the table as being riffled and smooth, or being unriffled, he merely means that one portion of the table is relatively rougher than the other; (2) that the Deister table may be regarded as a number of small Wilfley tables and that each of the small space at the end of one of the alternate riffles constitutes the smooth, plain, or unriffled portion called for by the Wilfley claims; (3) that these

(Testimony of Arthur S. Browne.)

small areas plus the inclined surface of the wash water board constitue the plain, smooth, or unriffled portion called for by the Wilfley claims; (4) that the aggregate of all these small areas constitute together the smooth, plain, or unriffled portion called for by the Wilfley claims. Witness then discusses at length each of these theories and expresses his dissent from it with argument as to each.

At the close of Mr. Browne's deposition counsel for the defendant put in evidence U. S. patent No. 258,879, to Blatchly [257] and Kustel, June 6, 1882, and U. S. patent to Lampert, No. 533,362, Jan. 29, 1895, which are marked respectively, "Defendant's Exhibit Blatchly & Kustel Patent 258,879," and "Defendant's Exhibit Lampert Patent 533,362."

[Testimony of William H. Bensman.]

WILLIAM H. BENSMAN

States that he is secretary, treasurer and manager of the Deister Concentrator Company; indentified drawing placed in his hands by counsel and states that it is a correct representation of Deister table No. 2 in its latest form of concentration; the drawing referred to by the witness is put in evidence by counsel for the defendant and marked "Defendant's Exhibit Blue Print Drawing."

[Testimony of Edward J. O'Connell.]

EDWARD J. O'CONNELL

States that he is second vice-president of the Deister Concentrator Company and performs the duty of salesman and table demonstrator; the Deister Concentrator No. 2 will handle as much feed and

(Testimony of Edward J. O'Connell.)

can be operated with less care and attention and less power than any other table; in the operation of the Deister table the clean concentrate is removed from the table as fast as it is made.

[Testimony of Frazer D. Reid.]

FRAZER D. REID

States that he lives at Cobalt, Ontario, Canada, and is a mill superintendent; has used Deister concentrator No. 2 for the [258] recovery of silver values; enumerates the following advantages which he has found to be possessed by the Deister concentrator— (1) its small area; (2) top does not bow nor get out of alignment, (3) top can be readily handled by two men, (4) practically no waste in changing linoleum as it wears evenly in every part, (5) table is not sensitive to irregular feed, (6) works well with two or more minerals of different specific gravities; (7) makes a clean concentrate with very little attention; once properly set will run for long periods with no attention except to oil the bearing surfaces.

[Endorsements]: Nos. 11 and 12. In Equity. In the District Court of the United States for the District of Arizona. The Mine and Smelter Supply Company, a Corporation, Complainant, vs. Detroit Copper Mining Company and The Arizona Copper Company, Corporations, Defendants. Condensed Statement of Evidence. Filed June 9, 1913. Allan B. Jaynes, Clerk. By F. E. McCrary, Deputy.

[Endorsements]: Nos. 11 and 12. In Equity. In the District Court of the United States for the District of Arizona. The Mine and Smelter Supply Company, a Corporation, Complainant, vs. Detroit Copper Mining Company and The Arizona Copper Company, Corporations, Defendants. Further Condensed Statement of the Evidence to be Included in the Record on Appeal. Filed June 17, 1913. Allan B. Jaynes, Clerk. By F. E. McCrary, Deputy.

[Defendant's Praecipe for Transcript of Record on Appeal.]

[259] *In the District Court of the United States Within and for the District of Arizona.*

Nos. 11 and 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant,

and

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Plaintiff,

vs.

ARIZONA COPPER COMPANY, a Corporation,

Defendant.

To the Clerk of the Above-entitled Court:

You will please prepare a transcript of the record

in the aforesaid causes, making a single transcript for [260] both causes and entitling the same as above, to be filed in the office of the clerk of the United States Circuit Court of Appeals for the Ninth Circuit under the appeal heretofore perfected to said court, and include in said transcript the following pleadings, proceedings and papers on file, to wit:

All orders, judgments and rulings made in each, either or both of said above-mentioned causes as the same appear on the records of said District Court for the District of Arizona;

All pleadings filed by the parties in said causes;

The testimony in said causes in the condensed and simplified form in which it has been prepared for this appeal by the appellant in obedience to paragraph (b) of Equity rule 75 under the approval of the Court.

You are further directed to transmit with the record without copying all the original exhibits on file in said causes, including paper exhibits on certified copies of public documents, photographs and mechanical exhibits put in evidence by either of the parties, among which are to be included the bound volume [261] entitled "BOOK OF COMPLAINANT'S PAPER EXHIBITS, DRAWINGS AND PHOTOGRAPHS," and the following exhibits introduced in evidence by the defendant, to wit:

"Two Metallic Scoops."

"Defendants' Exhibit Blue-print Drawing Illustrating Method of Taking Samples."

"Kiddie's Report of Tests."

"Defendant's Exhibit Drawing of Deister Table and

Record of Tests of Its Output."

"Defendant's Exhibit Dimensions of Wilfley Table."

"Defendant's Exhibit Dimensions of Deister Table."

"Defendant's Exhibit Record of Comparative Tests of Wilfley and Deister Ore Concentrators."

"Defendant's Exhibit Comparative Concentrating Surface of Deister and Wilfley Tables."

"Defendant's Exhibit Seven Samples of Concentrates Referred to in Testimony of Rudolph Gahl."

[262] Said transcript to be prepared as required by law and the rules of this court and the rules of the United States Circuit Court of Appeals for the Ninth Circuit, and on file in the office of the clerk of the said Circuit Court of Appeals, San Francisco, California, on or before July 15, 1913.

ROBERT S. TAYLOR,
ELWIN M. HULSE,
Solicitors for Defendant.

[Endorsements]: Nos. 11 and 12. In Equity. In the District Court of the United States Within and for the District of Arizona. The Mine and Smelter Supply Company, a Corporation, Complainant, vs. Detroit Copper Mining Company of Arizona, a Corporation, Defendant, and The Mine and Smelter Supply Company, a Corporation, Complainant, vs. Arizona Copper Company, a Corporation, Defendant. Praecipe. Filed June 11, 1913. Allan B. Jaynes, Clerk. By Frank E. McCrary, Deputy.

[Complainant's Praecipe for Transcript of Record on Appeal.]

[263] *In the District Court of the United States for the District of Arizona.*

No. 11—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Defendant,

and

No. 12—IN EQUITY.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Complainant,

vs.

ARIZONA COPPER COMPANY a Corporation,

Defendant,

To Allan B. Jaynes, Clerk of the District Court of the United States Within and for the District of Arizona.

In preparation of the transcript of the record in the above-entitled causes, to be filed in the office of the Clerk of the United States Circuit Court of Appeals for the Ninth Circuit, under the appeal heretofore perfected to said Court by the defendants in

said causes, in addition to the [264] testimony set forth in the condensed and simplified form prepared for said appeal by the solicitors for the defendants or appellants in accordance with the praecipe filed by the said solicitors, you will please include in such transcript as supplementing and by way of addition to the testimony set forth in said condensed and simplified statement of the defendants or appellants the testimony set forth in the "Further Condensed Statement of the Evidence to be Included in the Record on Appeal," prepared by solicitors for the complainant or appellee in said causes, which is tendered and filed herewith.

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors for Complainants.

[Endorsements]: No. 11 and 12. In Equity. In the District Court of the United States for the District of Arizona. The Mine and Smelter Supply Company, a Corporation, Complainant, vs. Detroit Copper Mining Company of Arizona, a Corporation, Defendant, and The Mine and Smelter Supply Company, a Corporation, Complainant, vs. Arizona Copper Company, a Corporation, Defendant. Filed June 17, 1913. Allan B. Jaynes, Clerk. By F. E. McCrary, Deputy.

Certificate of Clerk U. S. District Court to [Transcript of Record, etc.]

[265] United States of America,
District of Arizona,—ss.

I. Allan B. Jaynes, Clerk of the United States District Court for the District of Arizona, do hereby certify that the foregoing pages numbered from 1 to 264, inclusive, together with book of plaintiff's paper, exhibits, drawings, and photographs, Plaintiff's Exhibit 6, Plaintiff's Exhibit 7, Plaintiff's Exhibit 7 AW, Plaintiff's Exhibit 7AD, Plaintiff's Exhibit 65, Plaintiff's Exhibit 66, Plaintiff's Exhibit 67, Plaintiff's Exhibit 68, and the following Defendant's exhibits:

"Two Metallic Scoops."

"Defendant's Exhibit Blue-Print Drawing Illustrating Method of Taking Samples."

"Kiddie's Report of Tests."

"Defendant's Exhibit Deister Table Drawing."

"Defendant's Exhibit Drawing of Deister Table and Record of Tests of Output."

"Defendant's Exhibit Dimensions of Wilfley Table."

"Defendant's Exhibit Dimensions of Deister Table."

"Defendant's Exhibit Record of Comparative Tests of Wilfley and Deister Ore Concentrators."

"Defendant's Exhibit Comparative Concentrating Surface of Deister and Wilfley Tables."

"Defendant's Exhibit Seven Samples of Concentrates Referred to in Testimony of Rudolph Gahl."

—constitute and are a true and complete transcript of the record in the case of The Mine and Smelter Supply Company, a Corporation, Plaintiff, vs. The Detroit Copper Mining Company, a Corporation, Defendant, and The Mine and Smelter Supply Company, a Corporation, Plaintiff, vs. Arizona Copper Company, a Corporation, Defendant, numbers 11 and 12, in Equity, and I also annex and transmit the original citations in said cases. I further certify that the cost of preparing and certifying to said transcript of the record amounts to the sum of $162.70, and that the same has been paid in full by the defendants and appellants, The Detroit Copper Mining Company of Arizona and The Arizona Copper Company.

In testimony whereof I have hereunto set my hand and affixed the seal of said District Court at the City of Phoenix, in said District of Arizona, in the Ninth Judicial Circuit this 22d day of July, A. D. 1913, and the Independence of the United States of America, the 138th.

[Seal] ALLAN B. JAYNES,
Clerk United States District Court, District of Arizona.

[Citation on Appeal of Detroit Copper Min. Co. (Original).]

In the United States District Court for the District of Arizona.

No. 11.

United States of America,—ss.

The President of the United States of America to The Mines and Smelter Supply Co., a Corporation.

You and each of you are hereby cited and admonished to appear in the United States *Circuit of* Appeals for the Ninth Judicial Circuit within thirty (30) days from the date of this writ, pursuant to the appeal duly obtained and filed in the Clerk's office of the United States District Court for the District of Arizona, wherein you are appellees and Detroit Copper Mining Company of Arizona is the appellant, to show cause, if any there be, why the order and decree in said appeal mentioned should not be reversed and corrected, and why speedy justice should not be done to the parties in that behalf, and to do and receive that may appertain to justice to be done in the premises.

WITNESS, The Honorable WM. W. MORROW, Judge United States Circuit Court of Appeals, Presiding as Judge of the United States District Court for the District of Arizona, this 15 day of May, 1913.

WM. W. MORROW,
Judge.

United States of America,
District of Colorado,—ss.

I hereby certify that I have duly executed the within writ as follows, to wit:

As to The Mines and Smelter Supply Company by delivering to Albert H. Seep, personally, as the Vice-president of the said The Mines and Smelter Supply Company, a true copy of the within writ at Denver in said District on the 12th day of June, A. D. 1913.

Fees and Costs: $2.00.

D. C. BAILEY,
U. S. Marshal.
By E. B. Chadwick,
Deputy.

[Endorsed]: Marshal's No. 4232. No. 11. United States District Court, District of Arizona. Citation. Filed June 17, 1913. Allan B. Jaynes, Clerk.

No. 2291. United States Circuit Court of Appeals for the Ninth Circuit. Original Citation on Appeal. Received Jul. 26, 1913. F. D. Monckton, Clerk. Filed Jul. 26, 1913. F. D. Monckton, Clerk U. S. Circuit Court of Appeals for the Ninth Circuit.

Citation on Appeal of Arizona Copper Co. (Original).]

In the United States District Court for the District of Arizona.

No. 12.

United States of America,—ss.

The President of the United States of America to The Mines and Smelter Supply Co., a Corporation.

You and each of you are hereby cited and admonished to appear in the United States *Circuit of* Appeals for the Ninth Judicial Circuit within thirty (30) days from the date of this writ, pursuant to the appeal duly obtained and filed in the Clerk's office of the United States District Court for the District of Arizona, wherein you are appellees and Arizona Copper Company is the appellant, to show cause, if any there be, why the order and decree in said appeal mentioned should not be reversed and corrected, and why speedy justice should not be done to the parties in that behalf, and to do and receive that may appertain to justice to be done in the premises.

WITNESS, The Honorable WM. W. MORROW, Judge United States Circuit Court of Appeals Presiding as judge of the United States District Court for the District of Arizona, this 15 day of May, 1913.

WM. W. MORROW,
Judge.

United States of America,
District of Colorado,—ss.

I hereby certify that I have duly executed the within writ as follows to wit:

As to The Mines and Smelter Supply Company by delivering to Albert H. Seep, personally, as the Vice-president of the said The Mines and Smelter Supply Company, a true copy of the within writ at Denver in said District on the 12th day of June, A. D. 1913.

Fees and costs: $2.00

D. C. BAILEY,
U. S. Marshal.
By E. B. Chadwick,
Deputy.

[Endorsed]: Marshal's No. 4233. No. 12. United States District Court, District of Arizona. Citation. Filed June 17, 1913. Allen B. Jaynes, Clerk.

No. 2291. United States Circuit Court of Appeals for the Ninth Circuit. Original Citation on Appeal. Received Jul. 26, 1913. F. D. Monckton, Clerk. Filed Jul. 26, 1913. F. D. Monckton, Clerk U. S. Circuit Court of Appeals for the Ninth Circuit.

[Endorsed]: No. 2291. United States Circuit Court of Appeals for the Ninth Circuit. Detroit Copper Mining Company of Arizona, a Corporation, Appellant, vs. The Mine and Smelter Supply Company, a Corporation, Appellee, and Arizona Copper Company, a Corporation, Appellant, vs. The Mine and Smelter Supply Company, a Corporation, Appellee. Transcript of Record. Upon Appeals from the United States District Court for the District of Arizona.

Received July 26, 1913.

F. D. MONCKTON,
Clerk.

Filed July 26, 1913.

F. D. MONCKTON,
Clerk of the United States Circuit Court of Appeals for the Ninth Circuit.

By Meredith Sawyer,
Deputy Clerk.

No. 2291

United States

Circuit Court of Appeals

For the Ninth Circuit.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Appellee,

and

ARIZONA COPPER COMPANY, a Corporation,

Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Appellee.

Defendant's Exhibit "J," Certified Copy of File Wrapper and Contents of Wilfley Patent No. 590675.

Received August 27, 1913.

F. D. MONCKTON,
Clerk.

By MEREDITH SAWYER, Deputy Clerk.

[Defendant's Exhibit "J"—Certified Copy of File-Wrapper and Contents of Wilfley Patent No. 590,675.]

2—389.

UNITED STATES OF AMERICA,
DEPARTMENT OF THE INTERIOR.
PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify That the annexed is a true copy from the Records of this office of the File Wrapper and Contents in the matter of the

Letters Patent of Arthur R. Wilfley,

Number 590,675, granted September 28, 1897 for

Improvement in Ore Concentrators.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 7th day of November, in the year of our Lord one thousand nine hundred and seven and of the Independence of the United States of America the one hundred and thirty-second.

[Seal] C. C. BILLINGS,
Assistant Commissioner of Patents.

AMOUNT RECEIVED
$15 Ch
Chief Clerk.

Denver, Colo., March 12, 1897.

Hon. Com. of Patents,
Washington, D. C.

Sir:

Enclosed please find draft for $15, to be

applied in payment of the first government fee in the matter of the application of Arthur R. Wilfley, improvements in concentrators.

Respectfully,

A. J. O'BRIEN.

U. S. PATENT OFFICE.
Mar. 16, 1897.
CHIEF CLERK.

PETITION.

To the Commissioner of Patents:

The Petition of Arthur R. Wilfley citizen of the United States of America, residing at Denver in the County of Arapahoe State of Colorado prays that Letters Patent may be granted to him for improvements in Ore Concentrators as set forth in the annexed specification.

And he hereby appoints A. J. O'BRIEN, of Denver, Colorado, his Attorney with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the Patent, to sign the drawings and to transact all business in the Patent Office connected therewith.

Signed at Denver, in the County of Arapahoe and State of Colorado this 3rd day of March, 1897.

ARTHUR R. WILFLEY.

SPECIFICATION.

To all whom it may Concern:

Be it known, That I, Arthur R. Wilfley, a citizen of the United States of America, residing at Denver in the County of Arapahoe and State of Colorado have

invented certain new and useful improvements in Ore Concentrators and I do declare the following to be a full, clear and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in Ore Concentrators; and it consists of the features hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawing in which is illustrated an embodiment thereof.

In the drawings.

Fig. 1 is a side elevation of the apparatus partly in section.

Fig. 2 is a top or plan view of the same.

Fig. 3 is a plan view of the table.

Fig. 4 is a side elevation of the same.

Fig. 5 is a cross section of the table.

Fig. 6 is a detail view of a lever forming a part of the operating mechanism.

Fig. 7 is a perspective view of one of the riffles, detached.

Similar reference characters indicate corresponding parts in the views, let the numeral 5 designate the table provided with longitudinal riffles 8 attached to its upper surface. These riffles are of unequal length and angular in cross section. The vertical or upwardly projecting part of the riffle is designated by the reference character 8a—and the upper part which lies parallel with the bed of the

table is designated by the reference character 8c. The table tapers from the head toward the foot, where it is narrowest. It is transversely inclined (see Fig. 5), the gangue being discharged at its lower edge and the mineral at the tail thereof. The riffles increase in length from the upper edge of the table downward, where they are longest. The lowermost riffle extends nearly the full length of the table. The table has a longitudinal reciprocating movement, and is supported on rollers 7 mounted on a suitable stationary support.

Insert A June 24 '97

The mechanism for actuating the table will now be described. The extremity of the table farthest to the left (see Figs. 1 to 4 of the drawing) will, for convenience of description in this specification, be termed the head, while the opposite extremity is termed the tail of the table. To the head end of the table is attached a keeper 9 which is engaged by one extremity of a vertical lever 10 fulcrumed at 12 on a support 13 mounted on the stationary frame 14. The upper arm of the lever 10 is slotted (see Fig. 6) to receive a bolt 15, which holds a block 16 in place on the lever, This block carries an antifrictional roller 17 which engages the outer wall of the keeper 9. The block 16 is adjustable for the purpose of changing the bearing point on the keeper and thereby regulating the length of the table's stroke.

The lower arm of the lever 10 is provided with a bearing 18 which is engaged by one extremity of a link 19. This link is connected at 21 with a link 20 forming a toggle joint. One extremity of the link 20

engages a bar 22 attached to the stationary frame. The pin 21 connecting the two toggle parts also passes through one extremity of a pitman 23, whose opposite extremity is connected with a wrist 24 on a crank 25 carried by a shaft 26 journalled in an upright support 27 mounted on the stationary frame 14. The shaft 26 is provided with a pulley 28 which may be connected with any suitable motor for operating the mechanism. The outer extremities of the toggle are open, being simply recessed or forked to engage the bearings 18 and 22 respectively. Hence, as the shaft 26 is rotated, the toggles only impart the backward movement to the table or move it toward the left (see Fig. 3); the forward or reverse movement is effected or imparted by the recoil of a spring 29, which is compressed or placed under tension by the table during its backward movement.

In the operation of the machine, the material to be treated is discharged in the form of a pulp upon the upper left hand corner of the table (see Fig. 3). The gangue passes transversely downwardly over the angular longitudinal riffles and is discharged over the lower edge of the table,

which, as before stated, is transversely inclined. The mineral is caught by the riffles and the concentrates discharged as a comparatively clean product at the lower right hand corner of the table. By means of the riffles, the separation of the mineral from the gangue is effected. They check the tendency of the mineral to move transversely downward with the gangue. The part 8a of the riffles

Sub B June 24-97

would be sufficient alone to catch the larger and heavier particles of mineral; but some of the more minute particles would be forced over the riffles and carried downward with the gangue, [and perhaps finally lost] were it not for the part 8c of the riffles which checks this tendency and allows specific gravity to prevail, the same as in hand panning. It is well known that the finest particles of mineral can be saved by hand panning. The specific gravity of the finest particle of gold is, of course, the same as the largest nugget, and if the proper conditions exist, the minute particle can be saved as well as the nugget. The object of my angular riffles is to produce the conditions necessary to save, not only the largest, but also the finest mineral particles. Under ordinary conditions, these fine particles, when acted on by a current of water, are carried along with the water, and consequently lost with the gangue. The upper part 8c of my riffle checks the tendency of these light particles to pass over the riffles with the water. Hence, they are confined by the bed of the table below the part 8c of the

June 24 '97

riffles above, while the part 8a of the riffles checks their downward movement. Hence, under the influence of the table's movement or vibration, the mineral particles, both fine and coarse, are caught by the riffles. These mineral particles are, however, gradually moving toward the tail of the table under the influence of the latter's movement imparted by the operating mechanism heretofore explained. Hence, when the mineral reaches the free extremity of the uppermost riffle, it is, for a brief space of time, subjected to the free or unrestrained action of the water before passing to the riffle next below. During this space of time; it is deprived of some gangue which was also caught by the first riffle. The gangue once separated is carried downward by the water, while the mineral is caught by the next riffle and so on, each riffle in turn delivering a cleaner concentrate to the riffle next below until the lowermost riffle discharges the clean product at the lower right hand corner of the table.

It will be observed by an inspection of my operating mechanism that the length of the table's stroke may be regulated without changing altering or interfering with the quality of the movement imparted by the toggle. In other words, the speed of the table is always uniform when passing a given point in the same direction, regardless of the length of the table's stroke, which is regulated by adjust-

ing the height of the roller 17 on the lever. That is to say, the speed of the table is always the same when it has reached its limit of movement, or any other given part of its stroke when traveling in the same direction, whether the stroke be long or short.

With other toggle movements, as applied to this class of machines, the length of stroke is regulated by changing the point where the lower extremity of the connecting rod or pitman is attached to the toggle. This is equivalent to changing the length of the pitman and, of course, not only changes the length of the table's stroke, but also the quality of the movement. For instance, if the pitman be made shorter, the point where the toggle links are connected must move further upward but not so far downward, and vice versa. In other words, by changing the length of the pitman (or changing the point where it is attached to the toggle, which is the same thing), the angle of the links becomes greater when the table has reached its limit of movement in one direction, and less when the table has reached its limit of movement in the opposite direction. Hence, in such constructions, the speed of the table at a given point in its stroke varies as the length of the stroke is changed.

Having thus described my invention what I claim is:-

Sub. 6. June 24-'97

1. The transversely inclined concentrating table having longitudinal riffles varying in length, the riffle nearest the upper edge of the table being shortest and that nearest the lower edge of the table longest, while the intermediate riffles increase in length from the upper part of the table downward.

2. The transversely inclined concentrating table having longitudinal riffles of angular shape, the said riffles increasing in length from the upper edge of the table downward, the riffles being angular in shape and composed of the upwardly projecting part 8a and the part 8c projecting toward the upper edge of the table

3. A transversely inclined concentrating table having a longitudinal angular riffles composed of the parts 8a and 8c, the part 8a projecting upward from the bed of the table, and the part 8c extending toward the upper edge of the table and forming a suitable angle with the part 8a.

4. The combination with an ore separating table, of means for operating the same comprising a toggle, an operating pitman and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table.

5. The combination with an ore concentrating table, of means for operating the same comprising a toggle joint, and operating pitman and a lever, one link of the toggle

engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable bearing for regulating the length of the table's stroke

6. The combination with an ore separating table, of means for operating the same comprising a toggle joint, an operating pitman and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable roller adapted to engage a keeper carried by the table

7. The combination with an ore separating table, of means for operating the same comprising a toggle joint, an operating pitman and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable roller, said roller being mounted on a block adjustably attached to the lever.

8. The combination with an ore separating table, of means for operating the same comprising a toggle joint, an operating pitman and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with a vertical slot, and a block held in place by a bolt passing through the slot and carrying an anti-frictional roller engaging a keeper on the table.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR R. WILFLEY,

ALFRED J. O'BRIEN.

G. J. ROLLANDET.

OATH.

State of Colorado,

County of Arapahoe,—ss.

Arthur R. Wilfley, the above named petitioner, citizen of the United State of America, and resident of Denver in the County of Arapahoe and State of Colorado being duly sworn (or affirmed), deposes and says that he verily believes himself to be the original, first and sole inventor of the improvements in Ore Concentrators described and claimed in the foregoing specification; that the same has not been patented to him or to others with his knowledge or consent, in any country; that the same has not to his knowledge been in public use or on sale in the United States for more than two years prior to this application and he does not know and does not believe that the same was ever known or used prior to his invention thereof.

ARTHUR R. WILFLEY. (L. S.)

Sworn to and subscribed before me, this 3rd day of March, 1897.

GERNIT J. ROLLANDET,

Notary Public.

My commission expires May 27, '97.

U. S. PATENT OFFICE.
Mar. 16, 1897.
CHIEF CLERK.
Serial No. 627,798. Paper No. ½.
Application.
Filed Mar. 16, 1897.
A. R. Wilfley.

2—260.

Div. Room 243
All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

Paper No.
All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
Washington, D. C., Apr. 19, 1897.
Mailed " " "

Arthur R. Wilfley,
Care A. J. O'Brien,
Denver, Colorado.

Please find below a communication from the EXAMINER in charge of your application, #627,798, filed Mar. 16, 1897, for Ore Concentrators.

BENJ. BUTTERWORTH,
~~E. B. Moore,~~
Commissioner of Patents.

The statement in last three lines of page 6, requires modification, since the *rate* of movement of the table varies as the length of the lever between pivot *12* and bearing *17*, so long as that of the toggle does not change.

Claim 1 fails to distinguish from, and is rejected

in view of 415,999, Gates, Nov. 26th, 1889—Washers (C). See, also, 513,849, Waitt Jan. 30th 1894—same sub-class.

Claim 2 is rejected in view of 149,622, Wilder, Apr. 14th, 1874; or 349,504, Krause, Sept. 21st, 1886; 526,242, Look, Sept. 18th, 1894—Washers (C), and 170,978, Allain et al., Dec. 14th, 1875—Washers (B). See also, 528,503, Chatterson, Oct. 30th, 1894; and 565,812, Stoddard, Aug. 11th; 1896—Washers (C).

Claim 3 is rejected in view of Gates of Waitt Allain et al., and Stoddard, cited.

Claim 4 expresses no more than the substitution of a toggle for the cam of 203,872, Bagley, May 21st, 1878; or 291,270, Bailey et al., Jan. 1st, 1884—Washers (C)—destitute of invention in view of e. g., 27,882, Blake, Apr. 17th, 1860; or 158,800, Krom, Jan. 19th, 1875—Ore & Coal, Crushers.

Claim 5 is rejected in view of the references for claim 4, and 311,863, Cherney & Davis, Feb. 3d, 1885—Washers (C).

Claim 6 is not seen to present anything patentable over the references for claim 5, Gates and Chatterson, cited. It is merely a matter of judgment whether the anti-friction roller be carried by the table or the lever.

Claim 7 is rejected in view of the references for claim 6. See feature *H*, of Gates, cited.

Claim 8 is rejected as being for a mere permutation of features old in the above cited references.

LEWIS B. WYNNE,

Ex'r.

T. F. M. Div. XXV.

Serial No. 627,798. Paper No. 1.
Ex'r's Letter Rejection.
Dated Apr. 19, 1897.
Wilfley, A. R.

Denver, Colo., June 21, 1897.

Room 243.
Arthur R. Wilfley.
Ore concentrators.
Filed March 16, 1897.
Serial No. 627,798.

Hon. Com. of Patents: In response to Office Letter of April 19, 1897, in the above entitled case, the following amendment is made:

After the sentence closing with "table" in the 11th line of page 3 of the specification add the following:

A "To the left of the riffle extremities (see Fig. 3), there is a triangular portion A of the table which is smooth or free from riffles. The function of this smooth or unriffled portion of the table will be hereinafter described."

Erase all beginning with "The" in the first line of page 5 and ending with "gangue" in the 7th line of the same page and substitute the following:/"All

B the mineral, together with a portion of the gangue is first caught by the riffles, and under the influence of the table's motion is carried longitudinally toward the foot of the table, until it reaches the smooth or unruffled portion A of the table where it is acted on by the water which effects a perfect or

Arthur R. Wilfley.—2.

approximately perfect separation of the gangue from the mineral. As the material caught by the uppermost and shortest riffle passes to the portion A of the table, the action of the water, which is fed to the upper edge of the table, carries the gangue downward to the next riffle, while the mineral remains on the smooth portion A and is carried towards the tail of the table, where it is finally discharged. It is expected that some of the mineral caught by the uppermost and shortest riffle will be carried downward with the gangue to the next riffle which is longer. After leaving this last named riffle and passing to the smooth or unriffled portion of the table, the water again acts on the material and carries the gangue downward to the next riffle, leaving the clean mineral on the smooth portion A of the table. If any mineral escapes with the gangue the second time, it will be caught by the riffle next below and again subjected to the separating action of the water as soon as it reaches the smooth portion A of the table. In this manner, the material is carried transversely downward and longitudinally forward, the gangue being discharged at the lower edge of the table, completely impoverished of its mineral values, while the latter are discharged at the foot or tail of the table. A portion of the gangue, that is to say, the lighter part thereof, passes over each riffle in succession from the shortest or uppermost to the longest or lowermost

Arthur R. Wilfley.—3.

riffle. The mineral and the heavier gangue are caught by the riffles and finally separated on the

smooth portion A of the table. This combination in a concentrating table of riffles [of varying length], for catching the mineral, and a smooth, Aug. 17/97 plain, or unriffled portion at the extremities of the riffles where the final separation is effected through the action of the water, is believed to be entirely new in an apparatus of this class. A riffle is the best means of catching mineral, while a smooth, plain, or unriffled surface is the best for effecting the separation of the mineral from the gangue caught with the mineral by the riffles, the separation being effected by the action of water.

While I prefer to employ the angular riffle shown and described in this application, I do not limit the invention to any special construction of riffle. The function of the angular riffles will now be described in detail."

After the word "gangue" in the 11th line of page 5 insert "and perhaps finally lost."

Erase all beginning with "These mineral" in the 4th line on page 6 and ending with "table" in the 18th line of the same page. Also erase all beginning with "In other" in the 4th line from the bottom of page 6 and ending with "short" in the 5th line from the top of page 7.

Erase the original claims and substitute the following:

Arthur R. Wilfley- 4.

"1. A transversely inclined concentrating table having a movement whose tendency is to carry the material longitudinally forward toward the tail or foot of the table, said table being provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, the table having a smooth, plain, or unriffled portion extending from the extremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue effected.

2. A transversely inclined concentrating table having a series of longitudinal riffles extending a portion of the distance from the head toward the tail of the table, the table being provided with a smooth, plain, or unriffled portion located at the extremities of the riffles.

3. A concentrating table having a number of longitudinal riffles extending a portion of the distance from its head toward the tail thereof, the table being provided with an unriffled portion extending from the riffle extremities toward the tail or foot of the table.

4. A transversely inclined concentrating table having a number of longitudinal riffles extending a portion of the table's length from the head toward the foot, said riffles being of unequal length, the uppermost being the shortest while the other riffles increase in length from the upper

Arthur R. Wilfley- 5.

edge to the lower edge of the table, the table having a plain or unriffled portion lying at the extremities of the riffles and adapted to receive the material caught by the riffles.

Canceled Aug 17, 97.

5. A transversely inclined concentrating table having angular longitudinal riffles extending a portion of its length from the head toward the tail of the table, the table being provided with a plain or unriffled portion located at the extremities of the riffles and extending to the tail of the table.

6. A transversely inclined concentrating table having a number of riffles extending longitudinally thereof from the head toward the tail of the table, said riffles being composed of the parts 8a and 8c, the part 8a projecting upward from the bed of the table and the part 8c extending toward the upper edge of the table and forming a suitable angle with the part 8a, the table being provided with a plain or unriffled portion located at the extremities of the riffles and extending to the tail of the table

7. The combination of a transversely inclined concentrating table having a series of longitudinal riffles, and a plain or unriffled portion located at the extremities of the riffles, means for discharging water upon the upper edge of the table and means for imparting to the table a longitudinally reciprocating movement of a character adapted to cause the

material to travel from the head toward the tail of the table.

8. The combination of a transversely inclined concentrating table having a series of longitudinal riffles, and a plain or unriffled portion at the extremities of the riffles, means for feeding the material to the upper portion of the head of the table, means for discharging water on the upper edge of the table, and means for imparting to the table a reciprocating movement of such a character as to cause the material to travel from the head toward the foot of the table.

9. The combination of a transversely inclined concentrating table having a series of longitudinal riffles of unequal length extending from the head toward the tail of the table, and uppermost riffle being shortest and the riffles increasing in length from the upper to the lower edge of the table, the table having a plain or unriffled portion located at the extremities of the riffles, means for feeding the material to the upper portion of the table's head, means for discharging water to the upper edge of the table, and means for imparting to the table a movement adapted to cause the material to travel from the head toward the tail of the table.

3 ~~10.~~ The combination of a transversely inclined concentrating table having a number of longitudinal riffles of unequal length extending from the head toward the tail of

Arthur R" Wilfley- 7.

The table, said riffles increasing in length from the upper toward the lower edge of the table, said table being provided with a plain or unriffled portion at the extremities of the riffles, and means for imparting to the table a longitudinally reciprocating movement comprising a toggle, an operating pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the head of the table.

Cancelled Aug 17.'97

11. The combination of a transversely inclined table having a number of longitudinal riffles extending from the head toward the tail of the table, the table being provided with a plain portion extending from the extremities of the riffles to the foot of the table, and means for imparting to the table a longitudinally reciprocating movement, said means comprising a toggle joint, an operating pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable bearing for regulating the length of the table's stroke.

4 12. The combination of a transversely inclined concentrating table having a number of longitudinal riffles extending from the head toward the foot of the table, the table being provided with a plain or unriffled portion located at the extremities of the riffles, and means for imparting to the table a longitudinal reciprocating movement comprising a toggle joint, an operating pitman and a lever,

Arthur R. Wilfley—8.

one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable roller adapted to engage a keeper carried by the table.

5 ~~13.~~ The combination of a transversely inclined concentrating table having a series of longitudinal riffles extending from the head toward the foot of the table, the table being provided with a plain or unriffled portion extending from the riffle extremities to the foot of the table, and means for imparting to the table a longitudinally reciprocating movement, said means comprising a toggle joint, an operating pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable roller, said roller being mounted on a block adjustably attached to the lever.

6 ~~14.~~ The combination of a transversely inclined concentrating table having a number of longitudinal riffles extending from the head toward the tail of the table, the table being provided with a plain or unriffled portion located at the extremities of the riffles, and means for imparting to the table a longitudinally reciprocating movement comprising a toggle joint, an operating pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm

Arthur R. Wilfley—9.

of the lever is connected with the table and provided with a vertical slot, and a block held in place by a bolt passing through the slot and carrying an antifrictional roller engaging a keeper on the table.

7 ~~15.~~ The combination of a transversely inclined concentrating table having a series of riffles extending longitudinally from the head toward the tail of the table, said riffles being of unequal length, the uppermost being the shortest and the riffles increasing in length from the upper to the lower edge of the table, the table being provided with a plain or unriffled portion of suitable area located at the extremities of the riffles, means for feeding the material to the upper portion of the table's head, means for discharging water on the upper edge of the table, and suitable means for imparting to the table a longitudinally reciprocating movement of a character adapted to move the material from the head toward the tail of the table."

After a careful examination of the references, the claims as amended are believed allowable. It would seem that applicant is entitled to a broad claim for a table having a series of longitudinal riffles extending from its head toward its foot, the table being provided with a plain or unriffled portion at the extremities of the riffles whereby the separation if the mineral from the gangue is finally effected through the action of the water on the material after it leaves the riffles and reaches the plain or unriffled

portion of the table. This construction and mode of operation are nowhere disclosed by the references, and so far as applicant is aware, is entirely new in an apparatus of this class. The operation is so clearly set forth in the specification, as amended, and

so fully pointed out in the claims that further argument is believed superfluous.

Respectfully submitted,
A. J. O'BRIEN,
Attorney for Wilfley.

United States
Jun. 24, 1897.
Patent Office.

Patent Office.
June 25, 1897.
Division XXV.

Serial No. 627,798. Paper No. 2.
Amendment
A. C.
Filed June 24, 1897.
A. R. Wilfley.

Denver, Colo., June 23, 1897.

Room 243.

A. R. Wilfley.
Ore concentrator.
Filed March 16, 1897.
Serial No. 627,798.

Hon. Com. of Patents:

In response to Office Letter of April 19, 1897 in the above entitled case, it is applicant's wish that the drawing be corrected by applying the reference character "A" to the plain or unriffled portion of the table in Fig. 3 of the drawing to correspond with the amendment forwarded June 21, 1897.

Respectfully submitted,
A. J. O'BRIEN,
Attorney for Wilfley.

PATENT OFFICE.

Jun. 26, 1897.

DIVISION XXV.

UNITED STATES.

Jun. 26, 1897.

PATENT OFFICE.

Serial No. 627,798 Paper No. 3

Letter to Office

Filed June 26, 1897.

A. R. Wilfley.

2—260.

Div. Room 243

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

Paper No.

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
Washington, D. C., July 29, 1897.
Mailed " " "

Arthur R. Wilfley,
Care A. J. O'Brien,
Denver, Col.

Please find below a communication from the EXAMINER in charge of your application, #627,798, filed Mar. 16, 1897, for Ore Concentrators.

BENJ. BUTTERWORTH,
~~E. B. MOORE.~~
Commissioner of Patents.

Case as amended June 24th, 1897, further considered.

The first three claims are rejected in view of

258,879, Blatchly et al., June 6th, 1882—Washers (C).

Claim 4 may possibly be allowed.

The form of riffle must be better distinguished than by the term "angular," and until this is done, claim 5 is rejected in view of Blatchly et al., cited; but see 566,534, Pike, Aug. 25th, 1896—Washers (C).

Claims 6, 7 and 8 are rejected in view of the above, and 560,750, Pierce, May 26th, 1896—Amalgamators, Plate.

Claims 9 and 10 may possibly be allowed.

Claim 11 is rejected in view of Blatchly et al., cited, Krom and 291,270, Bailey et al., of record. Applicant has merely aggregated with Blachly et al., old reciprocating means shown in Krom.

Claim 12 may possibly be allowed, as may 13th, 14th and 15th.

LEWIS B. WYNNE,
Ex'r.
Div. XXV.

T. F. M.

Serial No. 627,798. Paper No. 4.
Ex'r's Letter Rejection
Dated July 29, 1897.
Wilfley, A. R.

Denver, Colo., August 14, 1897.

Room 243.
A. R. Wilfley.
Ore Concentrator.
Filed March 16, 1897.
Serial No. 627,798.

Hon. Com. of Patents: In response to Office Letter of the 29th ult. in the above entitled case, the following amendment is made:

In the 4th line of page 3 of the last amendment, namely that filed June 24, 1897, after the word "riffles" insert "of varying length."

In the 6th line of claim 1, after "foot" insert, "said riffles varying in length for the purpose specified."

Erase claims 2, 3, 5, 6, 7, 8, 9, and 11 and adjust originals as to remaining claims.

In view of the references it is believed that the first claim, as amended, should be allowed. That is to say, it is thought that applicant is entitled to a claim in which the arrangement of the riffles is not specified with the same preciseness as set forth in claim 4, since it would be quite easy to construct a machine that would not come within the literal wording of the language of claim 4 and yet have substantially applicant's construction. He, therefore, wishes to claim the riffles of different lengths in A. R. Wilfley.—2.

language somewhat more general than that set forth in the claims already allowed. The insertion in claim 1 by this amendment is believed to be suffi-

ciently exact, and at the same time, sufficiently comprehensive to answer applicant's purpose. The claim is also believed clearly allowable, in view of the Blatchly reference, since his riffles or corrugations formed in the rubber applied to the table, are all of the same length. Hence, his table will not perform the function of applicant's table.

It may be well to state that applicant's concentrating table has been in actual use for a considerable length of time, and has been found clearly satisfactory for the purpose intended. Applicant's argument, therefore, with reference to the variation in the length of the riffles is founded on actual fact and experience, as contradistinguished from mere theory.

It is evident that by varying the length of these riffles, the finer mineral may be saved. The upper riffles for instance catch the mineral and discharge it upon the smooth or unriffled portion of the table. The water which acts to separate the mineral from the gangue will not only carry the gangue downward, but also some of the finer mineral particles, while the coarser and heavier particles will remain on the smooth portion of the table. These finer mineral particles are caught by the next riffle and again

carried outward to the smooth portion of the table and the coarser particles again left upon the table and so on, with the result that by the time the finest mineral particles have passed downward to the lower edge of the table, they will be caught and saved while the gangue is discharged. Hence, applicant's concentrator is specially adapted for saving fine min-

eral, or that for which the ordinary concentrating tables are least adapted.

Respectfully submitted,
A. J. O'BRIEN,
Attorney for Wilfley.

UNITED STATES
AUG. 17, 1897.
PATENT OFFICE

PATENT OFFICE
Aug. 18, 1897.
DIVISION XXV.

Serial No. 627,798. Paper No. 5.
Amendment and
Argument.
Filed Aug. 17, 1897.
A. R. Wilfley.

ISSUE DIVISION.

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

Serial No. 627,798.

Serial No. 627,798.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C.,
August 23, 1897.

Arthur R. Wilfley,
c/o A. J. O'Brien,
Denver, Colo.

SIR: Your APPLICATION for a patent for an IMPROVEMENT IN Ore Concentrators filed Mar. 16, 1897, has been examined and ALLOWED.

The final fee, Twenty Dollars, must be paid, and

the Letters Patent bear date as of a date not later than SIX MONTHS from the time of this present notice of allowance.

If the final fee is not paid within that period the patent will be withheld, and your only relief will be by a renewal of the application, with additional fees, under the provisions of Section 4897, Revised Statutes. The office aims to deliver patents upon the day of their date, and on which their term begins to run; but to do this properly applicants will be expected to pay their final fees at least TWENTY DAYS prior to the conclusion of the six months allowed them by law. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and sealing, will consume the intervening time, and such work will not be done until after payment of the necessary fees.

When you send the final fee you will also send, DISTINCTLY AND PLAINLY WRITTEN, the name of the INVENTOR and TITLE OF INVENTION AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If you desire to have the patent issued to ASSIGNEES, an assignment containing a REQUEST to that effect, together with the FEE for recording the same, must be filed in this office on or before the date of payment of final fee.

Additional copies of Specifications and Drawings will be charged for at the following rates: Single

IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

Copies, uncertified, 10 cents each. The money should accompany the order.

Very respectfully,

BENJ. BUTTERWORTH,,

Commissioner of Patents.

After allowance, and prior to payment of the final fee, applicants should carefully scrutinize the description to see that their statements and language are correct, as mistakes not incurred through the cault of the office, and not affording legal grounds for reissues, will not be corrected after the delivery of the letters patent to the patentee or his agent.

[Stamped in margin:] The within title is that given by the Examiner in charge as most appropriate to your invention. Should you desire change in the same, satisfactory reasons MUST be given therefor on or before the payment of the final fee.

CERTIFICATE.

Amount Received

$20—

Chief Clerk.

Denver, Colo., Sept. 3, 1897.

Hon. Com. of Patents,

Washington, D. C.

Sir:

Enclosed please find certificate of deposit for twenty dollars in payment of the final *gv*ernment fee in the matter of the application of Arthur R. Wilfley, improvements in Ore concentrators, filed March 16,

1897, Serial No. 627,798, allowed August 23, 1897.

Respectfully,

A. J. O'BRIEN.

U. S. PATENT OFFICE.

Sep. 7, 1897.

CHIEF CLERK:

2–213.

Forwarded from Div. —— to Examiner of Interferences.

Paper No. ——

[INTERFERENCE.]

U. S. PATENT OFFICE.

Jan 4 1899

Ex'r of Interferences

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
Washington, D. C., Jan. 3, 1899.

Interference No. 19,820

Arthur R. Wilfley,
Care A. J. O'Brien,
Denver, Colorado.

Please find below a copy of a communication from the Examiner concerning your application No. 627,798, filed Mar. 16, 1897, for Ore Concentrators. Patent No. 590,675, dated Sept. 28, 1897.

Very respectfully,

C. H. DUELL,
~~F. I. ALLEN,~~
Commissioner of Patents.

Room No. 243

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

Your case, above referred to, is adjudged to interfere with others, hereafter specified, and the question of priority will be determined in conformity with the Rules.

The statement demanded by Rule 110 must be sealed up and filed on or before the 8th day of Feb., 1899, with the subject of the invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is

"1. A transversely inclined concentrating table having a movement whose tendency is to carry the material longitudinally forward toward the tail or foot of the table, said table being provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length for the purpose specified, the table having a smooth, plain, or unriffled portion extending from the extremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue effected."

"2. A transversely inclined concentrating table having a number of longitudinal riffles extending a portion of the table's length from the head toward the foot, said riffles being of unequal length, the uppermost being the shortest while the other riffles increase in length from the upper edge to the lower

edge of the table, the table having a plain or unriffled portion lying at the extremities of the riffles and adapted to receive the material caught by the riffles."

"3. The combination of a transversely inclined concentrating table having a series of riffles extending longitudinally from the head toward the tail of the table, said riffles being of unequal length, the uppermost being the shortest and the riffles increasing in length from the upper to the lower edge of the table, the table being provided with a plain or unriffled portion of suitable area located at the extremities of the riffles, means for feeding the material to the upper portion of the table's head, means for discharging water on the upper edge of the table, and suitable means for imparting to the table a longitudinally reciprocating movement of a character adapted to move the material from the head toward the tail of the table.

The 1st count in the above issue is your 1st claim, which interferes with the 3d claim of an application of Ira A. Cammett, of Denver, Colorado, whose attorney of record is Mr. Harold Binney, of New York City, New York.

The 2d count in the above issue is your 2d claim, which interferes with Cammett's 4th claim.

The 3d count in the above issue is your 7th claim, whish interferes with Cammett's 5th claim.

In case of decision unfavorable to Cammett, his 1st,

2d and 8th claims will be held unpatentable irrespective of other considerations.

LEWIS B. WYNNE,
Primary Examiner,
Division XXV.

N. F.

Pat. No. 590,675.
Serial No. 627,798. Paper No. 6.
Exrs. Letter Intf.
Dated Jan. 3, 1899.
Wilfley, A. R.

2—079.

INTERFERENCE. CARD.

Interference No. 19820 Paper No. 6.
Name, A. R. Wilfley,
Pat. 627,798.
Serial No. 590–675.
Title, Ore Concentrators.
Filed, March 16–97.
Dated Sept. 28–97.
Interference with Ira A. Cammett.

DECISIONS OF

Primary Examiner,.....Dated Jan. 3–1899.
Exr. of Interferences,..... "
Board,..... "
Commissioner,..... "

REMARKS:

.....
.....

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

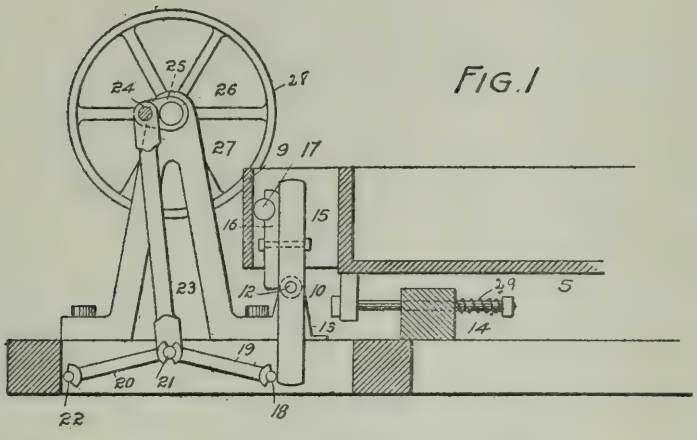
(No Model.) 2 Sheets—Sheet 1

A. R. WILFLEY.

ORE CONCENTRATOR.

No. 590,675. Patented Sept. 28, 1897.

FIG. 1



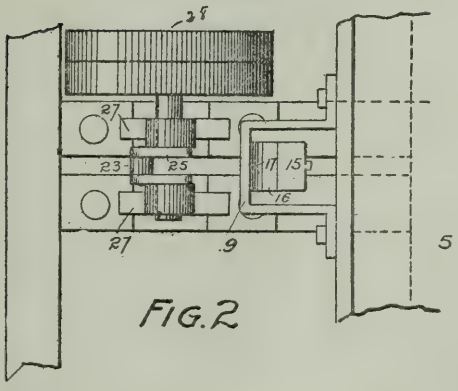


FIG. 2

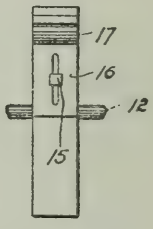
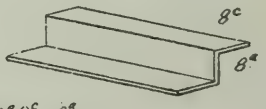


FIG. 6.



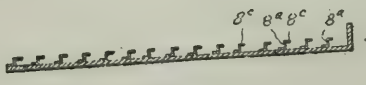


FIG. 7

FIG. 5

Witnesses
J. J. Holland
Edith Hopkinsworth.

Inventor
A. R. Wilfley
By his Attorney
A. J. Breen

(No Model.) 2 Sheets—Sheet 2.

A. R WILFLEY.

ORE CONCENTRATOR.

No. 590,675. Patented Sept. 28, 1897.

FIG. 3

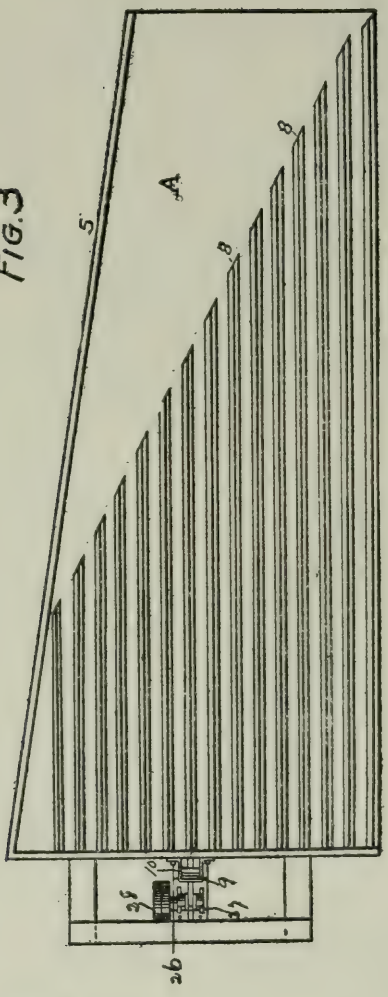
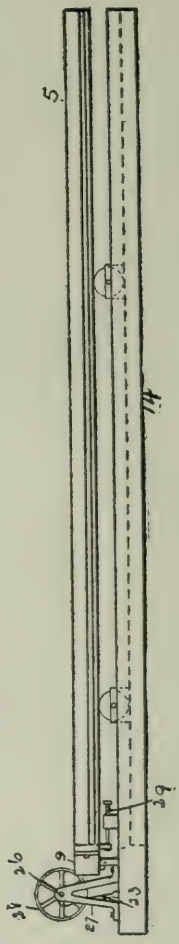


FIG. 4



Witnesses
E. J. Delaunette
Edith Hinsworth.

Inventor
A. R. Wilfley
By his Attorney
A. J. O'Brien

UNITED STATES PATENT OFFICE.

ARTHUR R. WILFLEY, OF DENVER, COLORADO.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 590,675, dated September 28, 1897.
Application filed March 16, 1897. Serial No. 627,798. (No Model.)

To all whom it may concern:

Be it known that I, ARTHUR R. WILFLEY, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Ore-Concentrators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in ore-concentrators; and it consists of the features hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation of the apparatus, partly in section. Fig. 2 is a top or plan view of the same. Fig. 3 is a plan view of the table. Fig. 4 is a side elevation of the same. Fig. 5 is a cross-section of the table. Fig. 6 is a detail view of a lever forming a part of the operating mechanism. Fig. 7 is a perspective view of one of the riffles detached.

Similar reference-characters indicate corresponding parts in the views.

Let the numeral 5 designate the table, provided with longitudinal riffles 8, attached to its upper surface. These riffles are of unequal length and angular in cross-section. The vertical or upwardly-projecting part of the riffle is designated by the reference-character 8^a, and the upper part, which lies parallel with the bed of the table, is designated by the reference-character 8^c. The table tapers from the head toward the foot, where it is narrowest. It is transversely inclined, (see Fig. 5,) the gangue being discharged at its lower edge and the mineral at the tail thereof. The riffles increase in length from the upper edge of the table downward, where they are longest. The lowermost riffle extends nearly the full length of the table.

To the left of the riffle extermities (see Fig. 3) there is a triangular portion A of the table, which is smooth or free from riffles. The function of this smooth or unriffled portion of the table will be hereinafter described.

The table has a longitudinal reciprocating movement and is supported on rollers 7, mounted on a suitable stationary support.

The mechanism for actuating the table will now be described.

The extremity of the table farthest to the left (see Figs. 1 to 4 of the drawings) will for convenience of description in this specification be termed the "head," while the opposite extremity is termed the "tail" of the table.

To the head end of the table is attached a keeper 9, which is engaged by one extremity of a vertical lever 10, fulcrumed at 12 on a support 13, mounted on the stationary frame 14. The upper arm of the lever 10 is slotted (see Fig. 6) to receive a bolt 15, which holds a block 16 in place on the lever. This block carries an antifrictional roller 17, which engages the outer wall of the keeper 9. The block 16 is adjustable for the purpose of changing the bearing-point on the keeper and thereby regulating the length of the table's stroke.

The lower arm of the lever 10 is provided with a bearing 18, which is engaged by one extremity of a link 10. This link is connected at 21 with a link 20, forming a toggle-joint. One extremity of the link 20 engages a bar 22, attached to the stationary frame. The pin 21 connecting the two toggle parts also passes through one extremity of a pitman 23, whose opposite extremity is connected with a wrist 24 on a crank 25, carried by a shaft 26, journaled in an upright support 27, mounted on the stationary frame 14. The shaft 26 is provided with a pulley 28, which may be connected with any suitable motor for operating the mechanism. The outer extremities of the toggle are open, being simply recessed or forked to engage the bearings 18 and 22, respectively. Hence as the shaft 26 is rotated the toggles only impart the backward movement to the table or move it toward the left. (See Fig. 3.) The forward or reverse movement is effected or imparted by the recoil of a spring 29, which is compressed or placed under tension by the table during its backward movement.

In the operation of the machine the material to be treated is discharged in the form of

pulp upon the upper left-hand corner of the table. (See Fig. 3.) The gangue passes transversely downwardly over the angular longitudinal riffles and is discharged over the lower edge of the table, which, as before stated, is transversely inclined.

All the mineral, together with a portion of the gangue, is first caught by the riffles, and under the influence of the table's motion is carried longitudinally toward the foot of the table until it reaches the smoother unriffled portion A of the table, where it is acted on by the water, which effects a perfect or approximately perfect separation of the gangue from the mineral. As the material caught by the uppermost and shortest riffle passes to the portion A of the table the action of the water, which is fed to the upper edge of the tables, carries the gangue downward to the next riffle, while the mineral remains on the smooth portion A and is carried toward the tail of the table, where it is finally discharged. It is expected that some of the mineral caught by the uppermost and shortest riffle will be carried downward with the gangue to the next riffle, which is longer. After leaving this last-named riffle and passing to the smooth or unriffled portion of the table the water again acts on the material and carries the gangue downward to the next riffle, leaving the clean mineral on the smooth portion A of the table. If any mineral escapes with the gangue the second time, it will be caught by the riffle next below and again subjected to the separating action of the water as soon as it reaches the smooth portion A of the table. In this manner the material is carried transversely downward and longitudinally forward, the gangue being discharged at the lower edge of the table completely impoverished of its mineral values, while the latter are discharged at the foot or tail of the table. A portion of the gangue—that is to say, the lighter part thereof—passes over each riffle in succession from the shortest or uppermost to the longest or lowermost riffle. The mineral and the heavier gangue are caught by the riffles and finally separated on the smooth portion A of the table. This combination, in a concentrating-table, of riffles of varying length for catching the mineral and a smooth, plain, or unriffled portion at the extremities of the riffles, where the final separation is effected through the action of the water, is believed to be entirely new in an apparatus of this class.

A riffle is the best means of catching mineral, while a smooth, plain, or unriffled surface is the best for effecting the separation of the mineral from the gangue caught with the mineral by the riffles, the separation being effected by the action of water.

While I prefer to employ the angular riffle shown and described in this application, I do not limit the invention to any special construction of riffle.

The function of the angular riffles will now be described in detail.

The part 8^a of the riffles would be sufficient alone to catch the larger and heavier particles of mineral, but some of the more minute particles would be forced over the riffles and carried downward with the gangue and perhaps finally lost were it not for the part 8^c of the riffles, which checks this tendency and allows specific gravity to prevail, the same as in hand-panning. It is well known that the finest particles of mineral can be saved by hand-panning. The specific gravity of the finest particle of gold is, of course, the same as the largest nugget, and if the proper conditions exist the minute particle can be saved as well as the nugget. The object of my angular riffles is to produce the conditions necessary to save not only the largest but also the finest mineral particles. Under ordinary conditions these fine particles when acted on by a current of water are carried along with the water, and consequently lost with the gangue. The upper part 8^c of my riffle checks the tendency of these light particles to pass over the riffles with the water. Hence they are confined by the bed of the table below the part 8^c of the riffles above, while the part 8^a of the riffles checks their downward movement. Hence under the influence of the table's movement or vibration the mineral particles, both fine and coarse, are caught by the riffles.

It will be observed by an inspection of my operating mechanism that the length of the table's stroke may be regulated without changing, altering, or interfering with the quality of the movement imparted by the toggle.

With other toggle movements as applied to this class of machines the length of stroke is regulated by changing the point where the lower extremity of the connecting-rod or pitman is attached to the toggle. This is equivalent to changing the length of the pitman and of course not only changes the length of the table's stroke, but also the quality of the movement. For instance, if the pitman be made shorter the point where the toggle-links are connected must move farther upward, but not so far downward, and vice versa. In other words, by changing the length of the pitman (or changing the point where it is attached to the toggle, which is the same thing) the angle of the links becomes greater when the table has reached its limit of movement in one direction and less when the table has reached its limit of movement in the opposite direction. Hence in such constructions the speed of the table at a given point in its stroke varies as the length of the stroke is changed.

Having thus described my invention, what I claim is—

1. A transversely-inclined concentrating-table having a movement whose tendency is to carry the material longitudinally forward

toward the tail or foot of the table, said table being provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length for the purpose specified, the table having a smooth, plain, or unriffled portion extending from the extremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue effected.

2. A transversely-inclined concentrating-table having a number of longitudinal riffles extending a portion of the table's length from the head toward the foot, said riffles being of unequal length, the uppermost being the shortest while the other riffles increase in length from the upper edge to the lower edge of the table, the table having a plain or unriffled portion lying at the extremities of the riffles and adapted to receive the material caught by the riffles.

3. The combination of a transversely-inclined concentrating-table having a number of longitudinal riffles of unequal length extending from the head toward the tail of the table, said riffles increasing in length from the upper toward the lower edge of the table, said table being provided with a plain or unriffled portion at the extremities of the riffles, and means for imparting to the table a longitudinally-reciprocating movement comprising a toggle, an operating-pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the head of the table.

4. The combination of a transversely-inclined concentrating-table having a number of longitudinal riffles extending from the head toward the foot of the table, the table being provided with a plain or unriffled portion located at the extremities of the riffles, and means for imparting to the table a longitudinal reciprocating movement comprising a toggle-joint, an operating-pitman and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable roller adapted to engage a keeper carried by the table.

5. The combination of a transversely-inclined concentrating-table having a series of longitudinal riffles extending from the head toward the foot of the table, the table being provided with a plain or unriffled portion extending from the riffle extremities to the foot of the table, and means for imparting to the table a longitudinally-reciprocating movement, said means comprising a toggle-joint, an operating-pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable roller, said roller being mounted on a block adjustably attached to the lever.

6. The combination of a transversely-inclined concentrating-table having a number of longitudinal riffles extending from the head toward the tail of the table, the table being provided with a plain or unriffled portion located at the extremities of the riffles, and means for imparting to the table a longitudinally-reciprocating movement comprising a toggle-joint, an operating-pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with a vertical slot, and a block held in place by a bolt passing through the slot and carrying an antifrictional roller engaging a keeper on the table.

7. The combination of a transversely-inclined concentrating-table having a series of riffles extending longitudinally from the head toward the tail of the table, said riffles being of unequal length, the uppermost being the shortest and the riffles increasing in length from the upper to the lower edge of the table, the table being provided with a plain or unriffled portion of suitable area located at the extremities of the riffles, means for feeding the material to the upper portion of the table's head, means for discharging water on the upper edge of the table, and suitable means for imparting to the table a longitudinally-reciprocating movement of a character adapted to move the material from the head toward the tail of the table.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR R. WILFLEY.

Witnesses:

ALFRED J. O'BRIEN.

G. J. ROLLANDET.

(Serial Number,)	DIV. (Ex'r's Book,)
626798	874
	230
	1897.
Patent No	590,675
	Arthur R. Wilfley
of	Denver
County of	
State of	Colorado
Invention	Ore Concentrators
Parts of application filed. Petition	Mar. 16, 1897.
Affidavit	" " "
Specification	" " "
Drawing 2 shts	" " "
Model	not required
Specimen	
First fee Cash	$15. Mar. 16–97
" " Cert.	
App. filed complete	Mch. 16–97.
Examined	Aug. 20th, 1897, Lewis B. Wynne,
Countersigned:	S. M. Pool,
8–21–97.	For Commissioner.
Notice of allowance	August 23, 1897. , 189 .
Final fee Cash	, 189 . , 189 .
" " Cert.	$20 Sept. 7, 1897. , 189 .
Patented	September 28, 1897. , 189 .
	A. J. O'BRIEN,
	Denver, Colo.

1897.

CONTENTS:

Application papers. O.K.

1 Rejection Apr. 19, 1897.
2. Amendment A–C Jun. 24, 1897.
3. Letter to Office Jun. 26, 1897.
4. Rejection July 29, 1897.
5. Amendment & Argt. Aug. 17, 1897.
6. Interference Card.
7. Fav. Dec. 11 Aug. 29th, 1899.
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23.

TITLE:

IMPROVEMENT IN Ore Concentrators.

H. R. Q.

L. M. F.

U. S. PATENT OFFICE.

COPY MADE Nov. 190

18149 5/07

[Endorsed]: In the District Court of the Fifth Judicial District of the Territory of Arizona. The Mine and Smelter Supply Co. vs. Arizona Copper Co. In Equity—#21A. Defendant's Exhibit "J." Certified Copy of File Wrapper and Contents of Wilfley Patent No. 590,675.

[Seal] A. M. PARKINS,
Special Examiner.

Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

[Certificate of Clerk U. S. District Court to Defendant's Exhibit "J."]

United States of America,
District of Arizona,—ss.

I, Allan B. Jaynes, Clerk of the United States District Court for the District of Arizona, do hereby certify that the above and foregoing is the original of Defendant's Exhibit "J," Certified copy of file-wrapper and contents of Wilfley Patent No. 590,675, which I hereby transmit to the United States Circuit Court of Appeals, Ninth Judicial Circuit, as a further supplemental transcript of the record in the cases of Mine and Smelter Supply Company, a Corporation, vs. Detroit Copper Mining Company of Arizona, a Corporation, No. 11, and Mine and Smelter Supply Company, a Corporation, vs. Arizona Copper Company, a Corporation, No. 12, in said court.

In Testimony Whereof, I have hereunto set my hand and affixed the seal of said court at Phoenix, Arizona, this 23d day of August, 1913.

[Seal] ALLAN B. JAYNES,
Clerk.

No. 2291

United States

Circuit Court of Appeals

For the Ninth Circuit.

DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation,

Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Appellee,

And

ARIZONA COPPER COMPANY, a Corporation,

Appellant,

vs.

THE MINE AND SMELTER SUPPLY COMPANY, a Corporation,

Appellee.

Supplemental Transcript of Record.

[Defendant's Original Exhibits "A," "B," "C," "D," "E," "F," "G," "H," and "I."]

Upon Appeal from the United States District Court for the District of Arizona.

[Defendant's Exhibit "A"—Drawings and Specifications of Letters Patent No. 513,849, to G. W. Waitt, Patented January 30, 1894.]

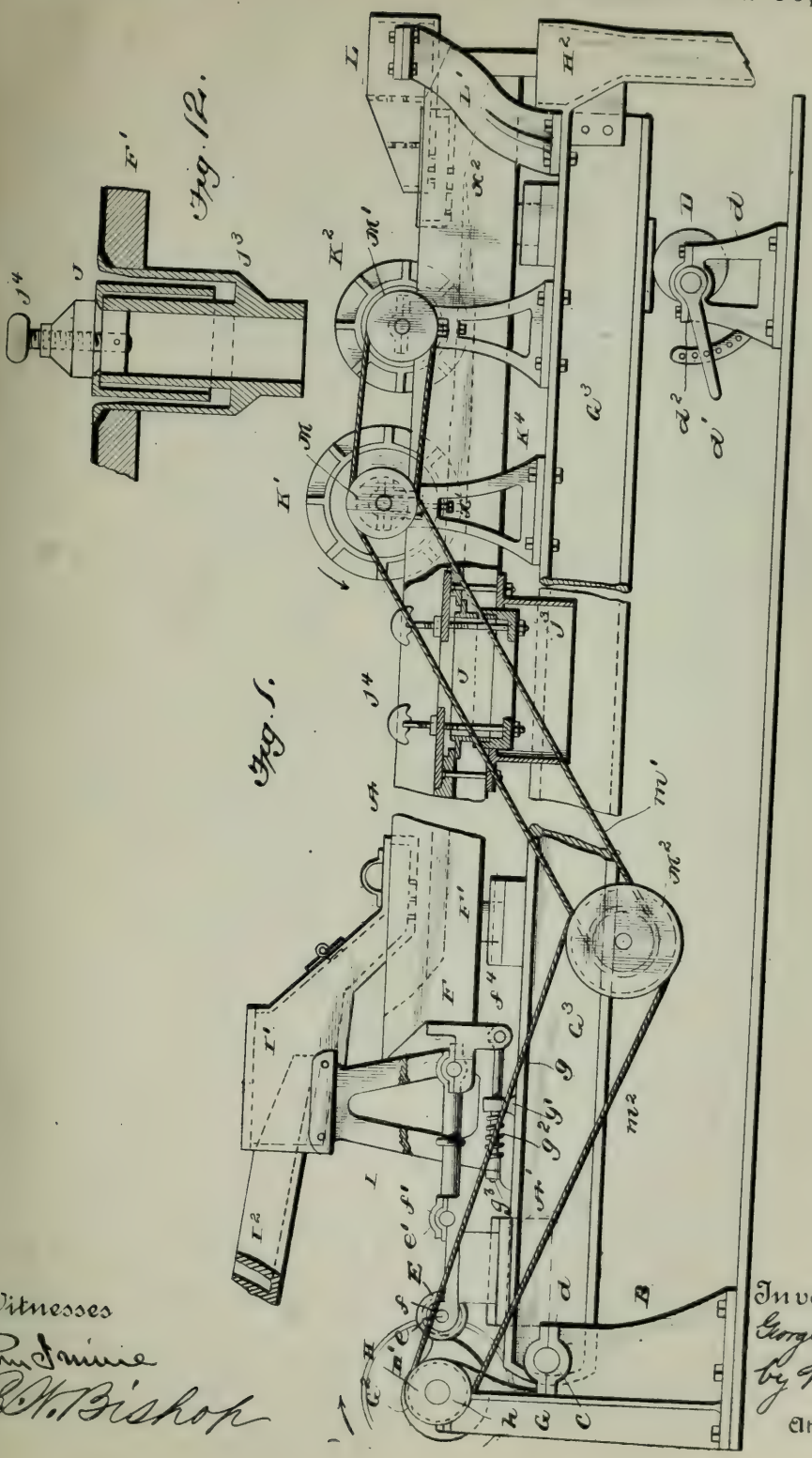
[Endorsed]: Mine & Smelter Supply Co. vs. Arizona Copper Co. Defendant's Exhibit "A." Patent to G. W. Waitt, #513,849. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "A." Received Aug. 20, 1913. F. D. Monckton, Clerk.

G. W. WAITT.

ORE CONCENTRATOR.

No. 513,849. Patented Jan. 30, 1894.



Witnesses

John Jaime

R. W. Bishop

Inventor

George W. Waitt

by Mackaye

Attorney

(No Model.) 4 Sheets—Sheet 2.

G. W. WAITT.

ORE CONCENTRATOR.

No. 513,849. Patented Jan. 30, 1894.

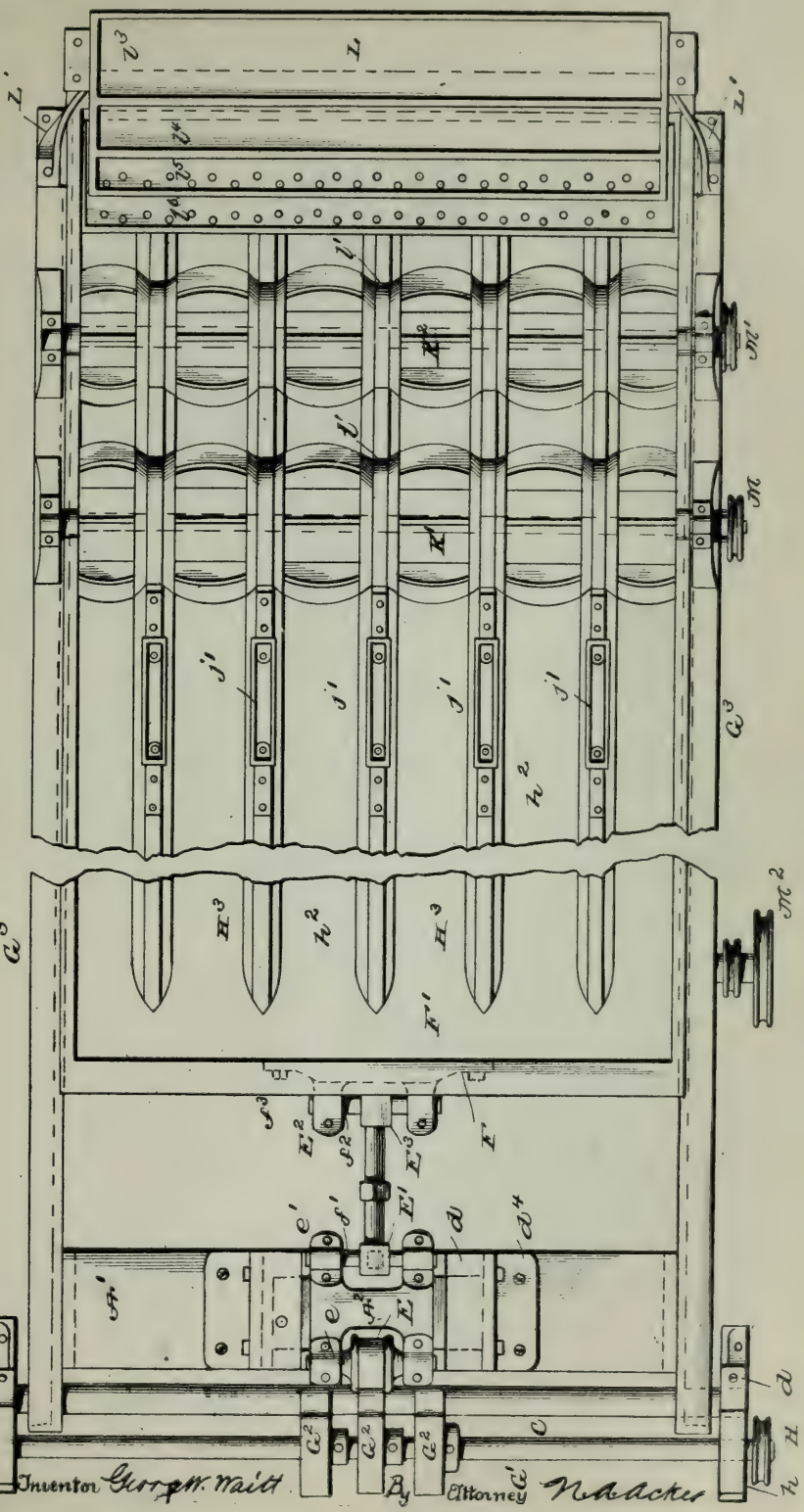


Fig. 2.

Witnesses
John Imrie
R. H. Bishop

Inventor Geo. W. Waitt
By
Attorney E. Baacker

(No Model.)

4 Sheets—Sheet 3.

G. W. WAITT.

ORE CONCENTRATOR.

No. 513,849. Patented Jan. 30, 1894.

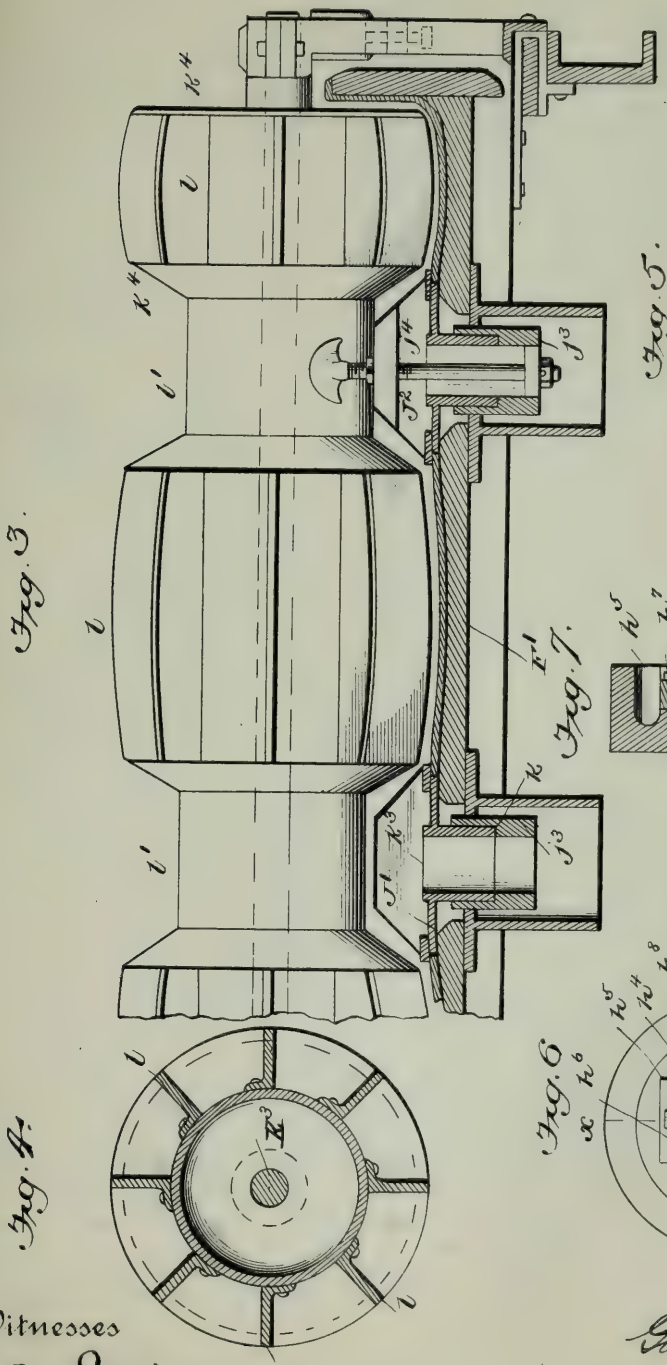


Fig. 3.



Fig. 5.

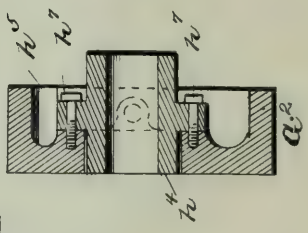


Fig. 7.

Fig. 4.

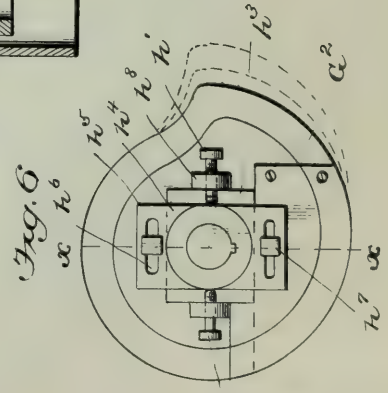


Fig. 6.

Witnesses

John Janvier

R. T. Bishop

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(No Model.)

4 Sheets—Sheet 4.

G. W. WAITT.

ORE CONCENTRATOR.

No. 513,849. Patented Jan. 30, 1894.

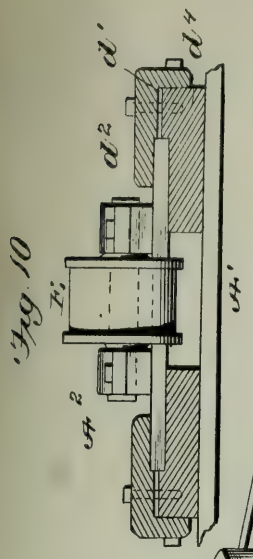


Fig. 10.

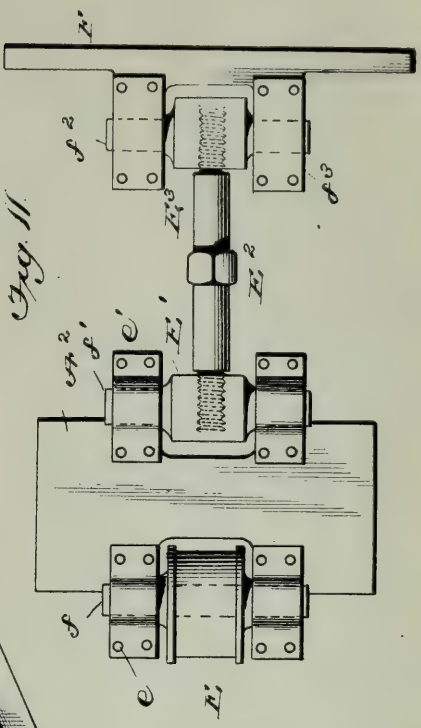


Fig. 11.

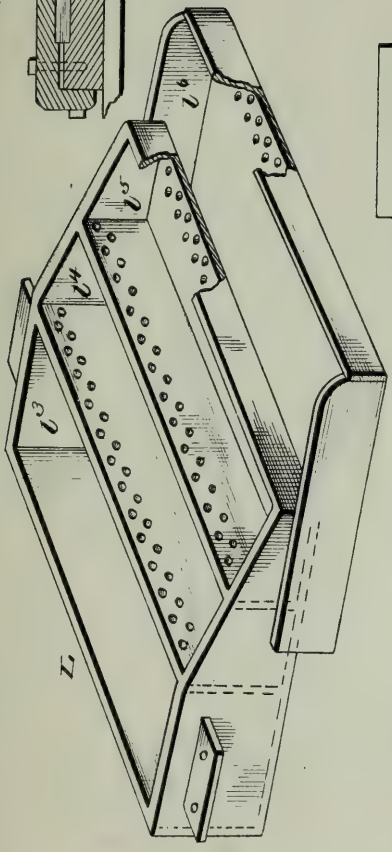


Fig. 8.

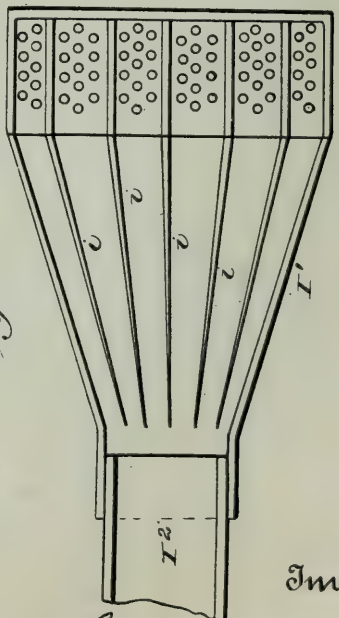


Fig. 9.

Witnesses

John Dennie

R. H. Bishop

Inventor

George W. Waitt

by Nicacker

Attorney

UNITED STATES PATENT OFFICE.

GEORGE W. WAITT, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO FOSTER S. DENNIS, OF KINGMAN, ARIZONA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 513,849, dated January 30, 1894.

Application filed May 25, 1893. Serial No. 475,515. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. WAITT, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Ore-Concentrators; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

My invention relates to certain new and useful improvements in ore concentrators, and it consists of the arrangement of parts and details of construction as will be hereinafter more fully set forth in the drawings, described and pointed out in the specification.

The object of my invention is to provide a concentrator which shall provide for the more perfect separation of the sulphurets from the sand and base material, and at the same time allow for the overflow of the gangue from the concentrating table.

Referring to the drawings forming a part of this application, in which similar letters of reference are used to denote corresponding parts throughout the entire specification, Figure 1 is a longitudinal sectional view of the entire machine. Fig. 2 is a top plan view thereof with pulp feeder removed. Fig. 3 is a detail view of the conveyers mounted above the concentrating bed. Fig. 4 is a similar view in cross section. Fig. 5 is a detail view showing one of the overflow tailing discharges or hoppers. Fig. 6 is a detail view of the adjustable operating cam, the dotted lines indicating the several cams having different contours; Fig. 7 a vertical sectional view of the cam taken on line x—x of Fig. 6; Fig. 8 a top plan view of the water distributer; Fig. 9 a similar view of the pulp feeder and distributer; Fig. 10 a detail view of the cam actuated roller; Fig. 11 an enlarged top plan of the movable frame for the cam actuated roller showing connecting rod attachment to the concentrator bed or table; Fig. 12 a modification of the overflow tailing discharge shown in Fig. 5.

The letter A indicates the concentrator proper, the frame of which is movably secured between the standards B, by means of the rod C, which is secured within bearings a, formed in said standards. The discharge end of said concentrator rests upon the cams D, one located under each of the side beams, which work within bearings formed in the standards d. By means of the handle d' and segment d^2, I am enabled to raise or lower said cam, and inasmuch as the longitudinal beams of the concentrator frame rest thereon necessarily raise or lower the same, which carrying therewith the concentrating bed regulates the inclination thereof. Upon the head cross beam A′, I secure the blocks a^4, and upon said blocks I secure the caps a', so as to form the longitudinal groove a^2, within which the operating frame A^2 slides, as more fully shown in Fig. 10. Within bearings e, e', I secure the short rods f, f', upon the former of which I mount the cam actuated roller E, while on the latter I locate the nut E′. Within said nut works one end of the connecting rod E^2, the other end of which works within the nut E^3, secured to the rod f^2, which is mounted in bearings f^3, formed in the outwardly extending portion of the plate F, which is secured to the concentrator bed F′. Said plate is provided with the downwardly extending tail piece f^4 which has connected thereto the spring actuated rod g. This rod extends through the opening formed in the standard g', which is secured to the side beam G^3, of the concentrator frame. Around said rod, to the outer side of the standard g', I place the spiral spring g^2, which is held securely thereon by reason of the nut g^3. Any number of spring actuated rods may be employed for the purpose of giving backward force to the concentrating bed, as hereinafter more fully set forth.

To the front of the machine I locate the standards G, and secure within bearings h, formed in the top thereof, the driving shaft G′, upon which I locate the single scroll cams G^2, preferably three in number, which are held in their adjusted position by means of the set screws h'. Said cams have the central rectangular opening, h^3, formed therein, which permits of the same fitting upon the rectangular blocks h^4, which are secured or feathered to the driving shaft G′. These blocks are provided with the flanged portion

h^5, which have the elongated slots, h^6, formed therein. Through these slots work the bolts h^7, which secure the cams. By means of the set-screws, h', working through the lip, h^5, and in block, h^4, I am enabled to move the cams forward or backward so as to increase or decrease the throw of the concentrating table. One quarter of the cam is made removable in order to permit the securing thereof upon the sliding blocks of the driving shaft. However, if so desired, all of the cams may be secured by means of long bolts passing therethrough. The blocks are all connected to the shaft, G', by spline and feather arrangement, as shown in Fig. 6, and the cams are secured in their adjusted position upon said blocks, by means of the set-screws h'. Only one cam of the series, of course, engages the cam-actuated roller E, and if it is desired, for the reason hereinafter stated, to change the cams so that a different one of the series may engage said cam-actuated roller, all that is necessary to be done is simply to loosen the set-screws, h', of the engaging cam, and then move the same and its block longitudinally on the feather until a point is reached where it is out of contact. The set-screws of said cam are then tightened, and the cam designed to next engage the roller is free to be moved to a position of contact, by simply loosening its set-screws h'. After the proper adjustment of this last-named cam is secured, the set-screws are then again tightened. To the outer end of the driving shaft the pulley H may be secured by means of which power is communicated to said driving shaft, while at the same or opposite end the driving pulley wheel H', is fastened. The single scroll cams vary in their contour so as to impart a stronger or lighter throw of the concentrating bed, as hereinafter more fully set forth and described.

The concentrating bed or table is indicated by the letter F', as before stated, which is level for a portion of its length, up to about the point x', (about two-thirds of its length) when it gradually incline to the point x^2, from whence it gradually inclines so as to make its discharge into receptacle H^2. The concentrating bed or table is made movable upon the concentrator frame, and is operated in the hereinafter described manner.

To the beams G^3, of the concentrator frame, I secure the standards I, and between said standards I locate the pulp distributer I', which is divided into distributing ways i, which correspond with the traveling ways formed in the concentrating bed, and are designed to make their discharge into said ways h^2, the surface of which I form slightly concaved between the longitudinal ribs H^3. The lower or discharge end of said distributer is provided with a series of openings through which the pulp fed from the mill through the conveyer I^2, is discharged. However, if so desired, said openings may be dispensed with and the lower end of the distributer left open for such discharge. At suitable intervals I provide the openings j', in the concentrating bed, for the purpose of permitting the overflow water and gangue to pass from the concentrating bed. Within said openings I place the rectangular overflow hopper J, which is provided with the overlapping flange J'; said flange resting upon the shoulder formed by providing the opening j'.

The letter J^3 indicates a supplemental or supporting pipe, which is secured to the bed by means of the screws j^4. Within this supplemental pipe the overflow hopper J, is adapted to fit, the lower end of said hopper resting upon a shoulder, k, formed in said supplemental pipe. Said rectangular overflow hopper is provided with the upper flange k^3, which permits the settling therearound of any of the sulphurets which may be washed toward the openings with the overflow of the tailings or waste material. The rectangular overflow hopper by preference I construct of rubber, but any suitable material, such as iron or steel, may be employed for this purpose with equally good results, as shown in Fig. 12. By means of the thumb screws j^4, I am enabled to raise or lower said overflow hopper so as to more effectually provide against the overflow of valuable sulphurets with the sand and water.

The letters K', K^2, indicate the rotary conveyers, which serve the purpose of carrying downward and checking the upward movement or travel of the sand upon the inclined portion of the table, thereby mechanically assisting the movement of the sand without interference with the travel of the sulphurets, and at the same time obviating the necessity of giving greater inclination to the concentrating table, or of using increased flow of water in order to create separation of sand and sulphurets. Said conveyers are mounted within bearings formed in the standards K^4, and the same I secure upon the shaft K^3, which has provided thereon a series of collars k^4. Between said collars I secure the paddles l, and regulate the same so as to just revolve above the concentrating bed level of the sulphurets, on the inclined portion. The collars have their outer faces formed at an incline, and have the space i' therebetween, so as to allow for the longitudinal ribs fitting therebetween.

To the rear of the concentrating frame I locate the water distributer L, which is supported by means of the standards L'. Said distributer is divided into separate compartments l^3, l^4, l^5, l^6, each of which has a series of perforations formed therein, so as to permit communication therebetween, and passage of the water from one into the other until finally discharged upon the concentrating bed. It often happens in the feeding of water, that the openings in the distributer become clogged by reason of leaves or other foreign matter accumulating therein, but by providing the same with separate compart-

ments uniting with one another, this defect is obviated and the leveling of the water in the compartments not prevented. The different compartments run in order of steps, as fully shown in Fig. 8. The point of discharge for the water is directly over the incline of the bed.

Upon the end of the pulp conveyers or shafts I secure the pulley wheels M, M′, which are connected to pulley M^2, by means of the cable m', and said pulley is connected to pulley H′, by means of cable m^2. As said pulley derives motion from driving shaft G′, the same is transmitted by reason of cable m^2, to pulley M^2, which in turn through the medium of cable m', imparts power to pulleys M, M′, which cause the rotation of the conveyers K′, K^2.

The operation of my machine is as follows:—With the rotation of the driving shaft G′, the single scroll cams revolve therewith. With such revolution one of the cams coming in contact with the roller E, mounted in sliding frame A^2, causes the latter to move forward in the slide groove a^2, which frame being connected to the concentrator bed through the medium of the connecting rod E^2, necessarily causes the same to move in the same direction. When the single scroll cam revolves sufficiently to give the concentrating table its greatest forward travel, the contour thereof allows of a quick, reverse motion to be imparted to said table for a portion of its travel, after which it gradually reduces to a slow motion until it completes its rear throw, the spring actuated rod g always holding the face of roller E in contact with the face of the cam, said rod g being secured to the downwardly extending tail-piece f^4 of the plate F′. As the pulp is discharged upon the bed of the table, it gradually moves forward toward the discharge end of the same by the motion imparted thereto, while the sulphurets of their own gravity, assisted by the motion of the bed, settle and naturally remain together thereon during their travel toward the discharge end of the concentrator. As the pulp reaches the overflow hopper, all sand and water above the adjustable edge thereof, will pass therethrough, while the sulphurets, carrying therewith a portion of the sand, will travel toward and up the inclined portion of the table, whereon the sand will be given a reverse or backward movement by the downwardly flowing current of water, assisted by the conveyer, so as to be finally discharged through the overflow hopper, which, as will be seen by the arrows, moves in an opposite direction to the bed of the table and thus will be separated from the sulphurets. However, the sulphurets, having greater specific gravity, will adhere to the bed of the table, and be carried up the inclined portion until finally discharged into the mineral or sulphurets receptacle. It will thus be observed that the pulp, including sand and sulphurets, travels in the same direction until the incline is reached, when they become separated and travel in opposite directions, the sand, as above stated, being carried by the action of the water and conveyer, toward the overflow hopper J. By providing the driving shaft G′, with an adjustable throw, I am enabled to give to the table or concentrating bed a longer or shorter throw; while by securing a series of cams on the shaft, each having different contour, I am enabled to impart to the table a quick or slow return, or in other words, a stronger or lighter jerk, thereby adapting the motion of the bed to various classes of ores.

I am aware that minor changes may be made in the arrangement of parts and details of construction herein shown and described without creating or necessitating a departure from the nature and scope of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with an ore concentrator, of the concentrating table, and of the rotary conveyers located above the concentrating bed and adapted to prevent the upward travel of the sand with the sulphurets, said conveyers being rotated through the medium of suitable mechanism, substantially as set forth and described.

2. In an ore concentrator, the combination of an adjustable supporting frame, standards at one end of said frame a driving shaft mounted in bearings at the upper end of said standards, a cam upon said shaft a sliding frame adapted to be actuated by the cam, a concentrating table or bed, a plate secured thereto, said plate provided with a downwardly-extending tail-piece, a rod for connecting the sliding frame with the plate, and a spring-actuated rod connected to the tail piece of said plate for imparting a reverse or backward movement to the concentrating bed, substantially as set forth.

3. In an ore concentrator, the combination of a supporting frame, standards at one end thereof, a driving shaft mounted in bearings at the upper ends of said standards, a series of cams splined to the shaft, said cams being of different contours, and a sliding frame adapted to be interchangeably engaged by said cams so as to have a variable motion imparted thereto, substantially as set forth.

4. In an ore concentrator, the combination of a supporting frame standards at one end thereof, a driving shaft mounted in bearings at the upper ends of said standards, cams upon said shaft, a sliding frame, a roller mounted in the rear end of said frame and adapted to be engaged by the cams, a concentrating table or bed connected to said sliding frame, and a spring-actuated rod for giving a reverse or backward movement to said concentrating table, substantially as set forth.

5. In an ore concentrator, the combination of a supporting frame provided with an upwardly extending standard, a movable con-

centrating table or bed, a plate secured to the end thereof provided with a downwardly extending tail piece, a rod passing through the standards of the supporting frame and having one end connected to the tail piece, a nut upon the opposite end of said rod, and a spring interposed between the standard and the nut, substantially as set forth.

6. In an ore concentrator, the combination of a supporting frame, standards at one end thereof, a driving shaft mounted in bearings at the upper ends of said standards, a series of cams upon said shaft, a sliding frame, a short shaft mounted in bearings in the rear end of the frame, a similar shaft mounted in the forward end of the sliding frame, said shaft carrying a nut, a concentrating table or bed, a plate secured thereto, a shaft journaled in bearings in the outwardly-extending portion of said plate, said shaft carrying a nut, a connecting rod having one end working in the nut of the sliding frame, and its opposite end working in the nut of the plate, and the spring-actuated rod for giving to the concentrating table or bed a reverse or backward movement, substantially as set forth.

7. In an ore concentrator, the combination of a supporting frame, standards at one end thereof, a driving shaft mounted in bearings at the upper ends of said standards, cams upon said shaft an end cross beam upon the supporting frame, blocks secured to said cross beam, caps secured to the blocks said blocks and caps provided with registering cut-away portions to form ways, and a sliding frame working in said ways, adapted to be actuated by the cam, substantially as set forth.

8. In an ore concentrator, the combination of a concentrating table or bed provided with a series of openings, of hoppers extending through said openings, and vertically adjustable so as to bring their upper ends above the plane of the concentrating table, in order to prevent the escape of the mineral bearing lower stratum, substantially as set forth.

9. In an ore concentrator, the combination of a concentrating table or bed provided with a series of openings therein, rectangular hoppers placed within the openings and provided at their upper ends with outwardly and upwardly extending flanges, supplemental or supporting pipes provided with shoulders forming seats for the lower ends of the hoppers, and screws for adjusting the height of the hoppers, substantially as set forth.

10. In an ore concentrator, the combination with a movable concentrating table provided with a series of longitudinal ribs, of conveyers provided with a series of annular depressions registering with the longitudinal ribs of the table; said conveyers rotating in a direction opposite to the line of movement of the concentrating table, substantially as set forth.

11. In an ore concentrator, the combination with a movable concentrating table provided with a series of longituding ribs, the space between said ribs being slightly concave, of conveyers rotating in a direction opposite to the line of movement of the concentrating table, consisting of a series of collars, and paddles secured between said collars, the space between a set of the collars registering with the longitudinal ribs of the table, substantially as set forth.

12. In an ore concentrator the combination of a concentrating table or bed, conveyers located above said table or bed, adapted to move in a direction opposite to the line of movement of the concentrating table or bed, and a water distributer secured to the rear of the concentrating bed, said distributer consisting of a series of departments arranged one below the other, and having a series of perforations formed therein, substantially as set forth.

13. In an ore concentrator the combination with a movable concentrating frame, said frame inclined upwardly between two given points, and provided with a series of discharge hoppers, of conveyers arranged above the concentrating bed and rotating in a direction opposite to the line of movement of the concentrating frame, substantially as set forth.

14. In an ore concentrator, the combination of a movable concentrating frame, upwardly inclined between two given points, and downwardly inclined from one of said points to the discharge end of the bed, said frame also provided with a series of discharge hoppers, conveyers rotating in a direction opposite to the path of movement of the concentrating bed, and a water distributer located at the discharge end of the concentrating bed, substantially as set forth.

15. In an ore concentrator the combination with a movable concentrating table or bed, provided with a series of longitudinal ribs forming concave spaces, of a pulp distributer divided into a series of distributing ways registering with the spaces of the concentrating table, the lower or discharge end of said distributer being perforated, substantially as set forth.

16. In an ore concentrator the combination of a supporting frame, standards secured thereto, a driving shaft mounted in the upper end of said standards, a driving wheel secured on one end of said shaft, a pulley mounted upon a shaft in bearings beneath the supporting frame, endless belt connecting said pulleys, a concentrating bed or table, rotary conveyers mounted upon shafts above the concentrating bed, said shaft provided with belt pulleys, a belt connecting the pulley beneath the supporting frame with the pulley of the rear conveyer, and a belt connecting the conveyer pulleys, substantially as set forth.

17. The combination of a driving shaft, rectangular flanged blocks feathered upon said shaft, said flanges provided with elongated horizontal slots, cams fitting upon said blocks, and set screws working through the slots, substantially as set forth.

18. The combination of a driving shaft rect-

angular blocks feathered thereon, cams fitting upon the blocks, said cams provided with laterally projecting lips, and set screws working through said lips, so as to bear upon the blocks, substantially as set forth.

19. The combination of a driving shaft, rectangular flanged blocks feathered thereon, said flanges provided with elongated horizontal slots, cams fitting upon said blocks, and provided with laterally extending lips, set screws working through the elongated slots of the blocks into the cams, and set screws working through the lips of the cams, and bearing upon the blocks, substantially as set forth and described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE W. WAITT.

Witnesses:
N. A. ACKER,
M. G. LOEFLER.

[Defendant's Exhibit "B"—Drawings and Specifications of Letters Patent No. 415,999, to G. Gates, Patented November 26, 1889.]

[Endorsed]: Mine & Smelter Supply Co. vs. Arizona Copper Co. Defendant's Exhibit "B." Patent to G. Gates, #415,999. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "B." Received Aug. 20, 1913. F. D. Monckton, Clerk.

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G. GATES.

CONCENTRATOR.

No. 415,999. Patented Nov. 26, 1889.

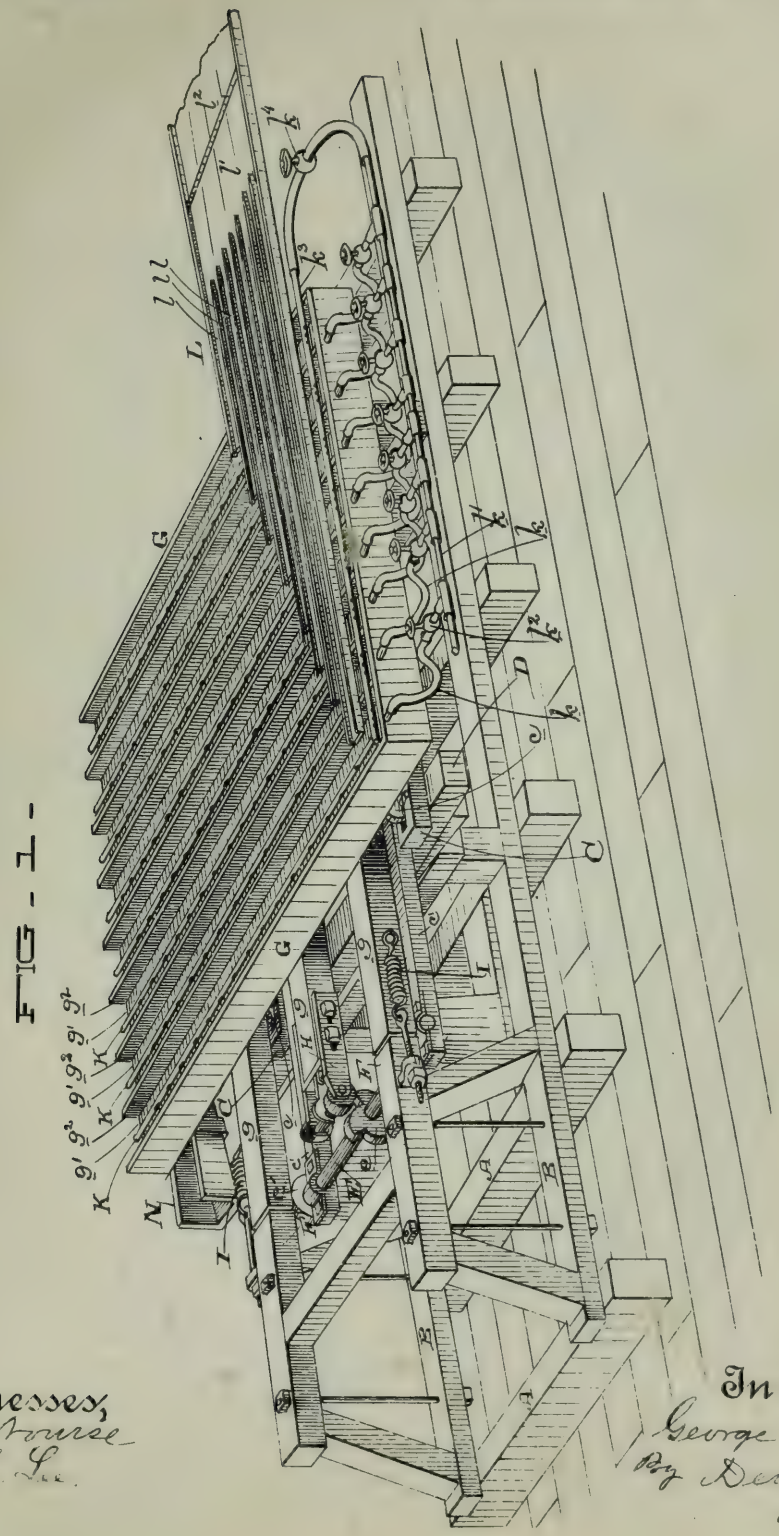


FIG. 1.

Witnesses,
C. D. Mourse
A. C. Lee

Inventor,
George Gates
By Dewey & Co
Attys

(No Model.) 3 Sheets—Sheet 2. 321

G. GATES.

CONCENTRATOR.

No. 415,999. Patented Nov. 26, 1889.

FIG-2-

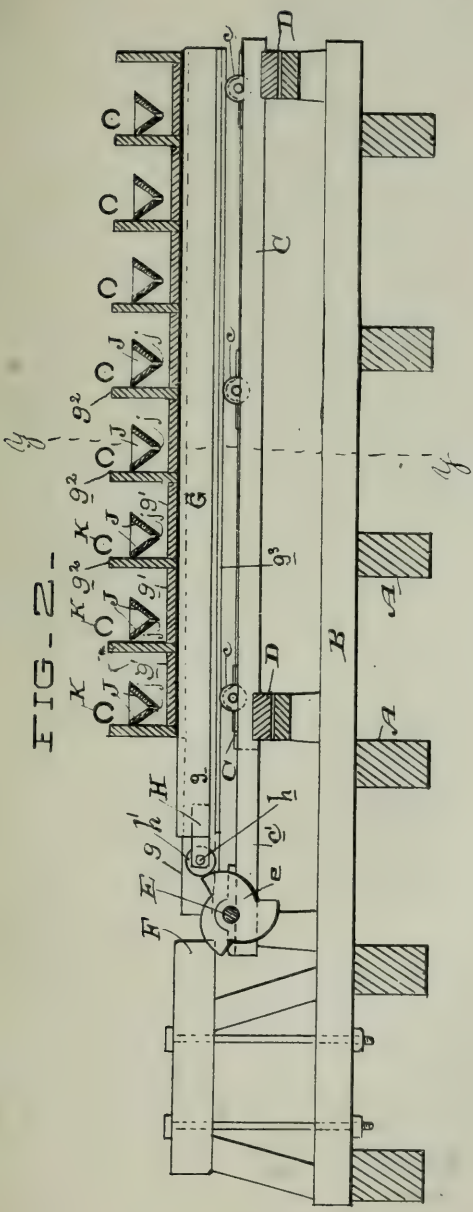
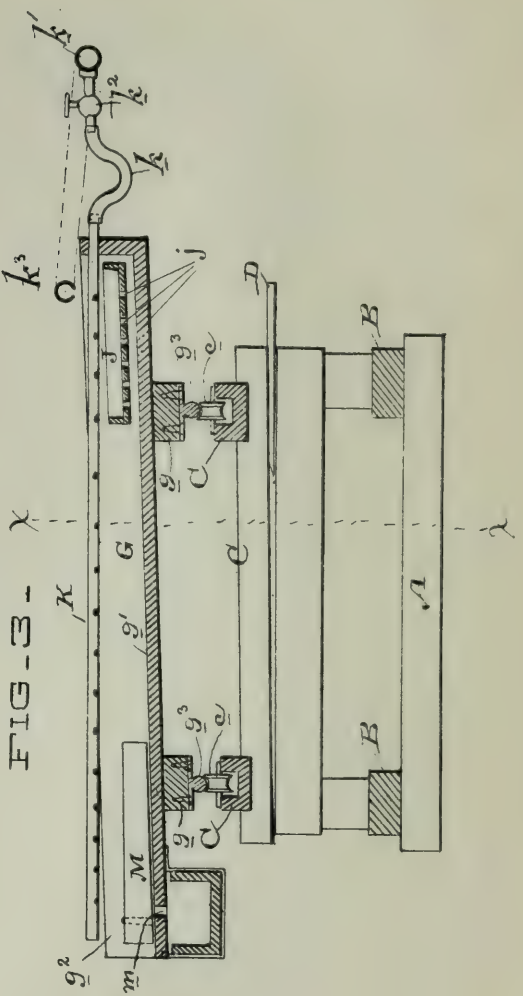


FIG-3-



Witnesses,
J. H. Nourse
H. C. Lee.

Inventor,
George Gates
By Dewey & Co
Attys

(No Model.) 3 Sheets—Sheet 3.

G. GATES.

CONCENTRATOR.

No. 415,999. Patented Nov. 26, 1889.

FIG. 5.

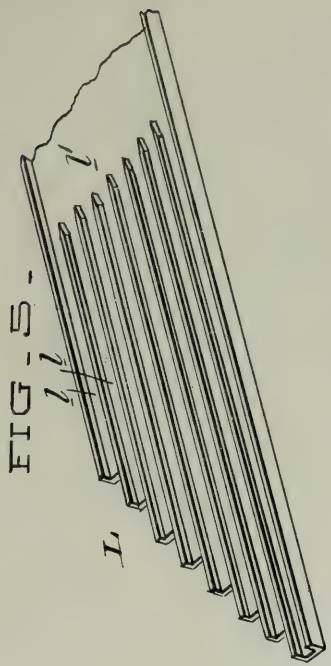


FIG. 6.

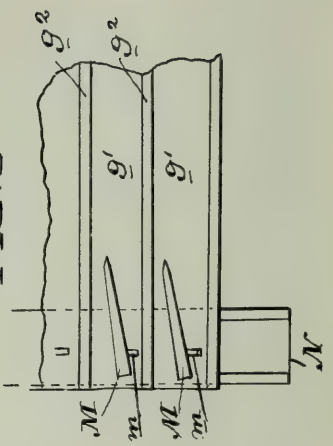
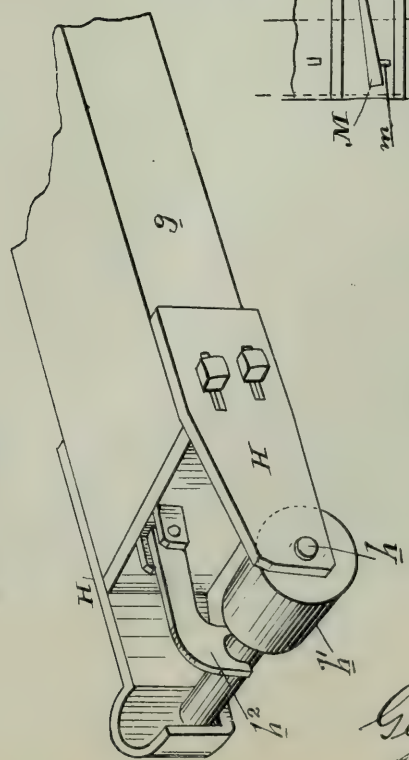


FIG. 4.



Witnesses,
P. Towse.
H. C. Lee.

Inventor,
George Gates
By Dewey & Co
Attys

GEORGE GATES, OF DRYTOWN, CALIFORNIA.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 415,999, dated November 26, 1889.

Application filed July 1, 1889. Serial No. 316,253. (No model.)

To all whom it may concern:

Be it known that I, GEORGE GATES, of Drytown, Amador county, State of California, have invented an Improvement in Concentrators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of machines for concentrating ores, in which the separation takes place upon a concentrating-table, to which is given a jarring movement; and my invention consists in the combinations and arrangement of parts, hereinafter fully described, and specifically pointed out in the claims.

The object of my invention is to provide a machine capable of effective and thorough concentration.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view of my concentrator. Fig. 2 is a vertical longitudinal section on the line x x of Fig. 3. Fig. 3 is a cross-section on the line y y, Fig. 2. Fig. 4 is a detail perspective of the roller h' and connections. Fig. 5 is a detail perspective of the feeder L. Fig. 6 is a plan of the foot of two of the runs g', showing the flanges M and discharge-slots m.

The frame-work or foundation of the machine is made up of the cross-pieces A, on the tops of which are secured the beams B, and on these beams is properly supported the adjusting-frame C, the lateral inclination of which may be varied to change the grade of the concentrating-table by means of the wedges D, adapted to be driven under it at one side. In the top of this adjusting-frame, on each side, are mounted the carrying-rollers e, and said frame is also provided with longitudinal strips e', the projecting ends of which serve as carriers for the cam-shaft E, upon which is mounted the cam e and a driving-pulley e'.

F are upright stationary buffer-frames mounted on the fixed foundation of the machine.

G represents the concentrating-table generally and is made up of longitudinal base-pieces g and a cross-platform which is divided into a number of parallel runs or channels g', formed by intervening raised strips g^2. The table G has tracks g^3, secured under its base-pieces g, and these tracks rest upon the grooved carrying-rollers e of the adjusting-frame. It will be seen that the concentrating-table G being mounted upon the frame C, as shown, its parallel runs or channels g' extend transversely of the machine, and the grade of these runs or channels may be adjusted and regulated by adjusting the inclination of the frame C by means of the wedges D, as heretofore mentioned. The two side beams g of the table serve as buffers to act against the buffer-frames F of the fixed foundation-frame, while the middle piece g has connected with its end a bracket H, having a cross-shaft h, on which is mounted a roller h', against which the cam e on the cam-shaft E is adapted to operate, whereby the entire table G is moved forwardly on the machine, traveling easily on the rollers e. The table is drawn back, so as to bring its pieces g into contact with the buffer-frames F to produce a jar, by means of the springs I, which are secured to the pieces g at one end and are adjustably connected with the buffer-frames F at the other end, whereby their tension may be properly regulated.

By rotating the cam-shaft E its cam e will act against the roller h' and thereby force the concentrating-table forward, and as it relieves said table the springs I will draw it backward, so that its pieces g come in contact with the buffer-frames and will produce a jar in a direction at right angles to the flow of material on the table. Within the runs or channels g', and at one side thereof, being the side next to the jarring mechanism, are fixed the boxes J, having a V shape, and commencing at the head of each run or channel and thence extending a short distance, in practice about eighteen inches. The boxes are provided with perforations j in their bottoms, so that the material fed to them is discharged at one side of the runs or channels.

K are perforated fresh-water pipes located in each run or channel g' and at one side thereof, being the same side on which the material is fed. These water-pipes extend the whole length of the runs or channels and are each connected at its head by pipes k

with the main water-pipe k', the communication being regulated and controlled separately and independently by the cocks k^2. With the main pipe k' is also connected a supplementary perforated feed-water pipe k^3, which extends across the head of the table and across all the runs and is controlled by a cock k^4. It is adapted to discharge its water into the distributing-boxes J.

L is the feeder for the table. This consists of a number of parallel passages l, having regularly-increasing lengths, as shown, said passages communicating at their heads with the feed-chamber l', to which ore is fed over the apron l^2. This feeder is carried on the top of the table G at the head of its runs or channels, and the passages l of said feeder extend at right angles to the runs of the table, and by reason of their varying lengths there is one passage of the feeder for each run or channel of the table. The ends of the feeder-passage are in communication directly over the boxes J in the runs or channels of the table, so that the ore is fed directly into said boxes.

In order to throw the table out of connection with the cam-shaft, without stopping the movement of said shaft, I make the roller h' movable on its shaft h, so that it can be thrown over to one side out of the way of the cam e, whereby said cam may revolve freely without touching it; but when in position to be acted upon by the cam said roller is held by the swinging latch-arm h^2.

In the lower end of each run or channel g' is a slightly-inclined guide-strip M, on one side of which is a slot or opening m through the floor of the run or channel and communicating with the discharge-trough N.

The operation of the concentrator is as follows: The material is fed down from the battery of the stamp-mill over the apron l^2 into the feed-chamber l', from which it passes, and is distributed equally into each of the passages l of the feeder L. Thence it is discharged from the said passages into the boxes J in each of the runs or channels of the concentrating-table. In these boxes the material is again distributed equally through the perforations j, and, together with the water which is fed from the upper ends of the fresh-water pipes K, passes down into the runs or channels and wholly upon one side thereof, this side being the side next to the jar which the table receives. The water from the pipes K, falling also directly into the runs or channels below the boxes and upon the same or jar side of the channels, produces a transverse wave in the said channels, which, on account of the initial position of the material and the jar which the table receives, carries the sand and light worthless material off to the other side of each run or channel, leaving the concentrates upon the first side, so that in each run or channel there are two distinct streams of material, the one on the jar side being the concentrates, which confine themselves to that side, while the other is the worthless material, which is thrown to and remains on the other side. These two streams of material are by this construction kept very distinct from each other, and at the foot of each run or channel they are guided by the strip M, the concentrates passing into the slot m, from which they pass into the discharge-trough N, and the worthless material passes off the end of the run or channel.

The object of the supplementary water-pipe k^3 is to supply additional water to the material when required.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a concentrator, a table having its surface divided into a number of independent inclined runs or channels, said table being adapted to have a jarring or shaking movement at right angles to the flow of the material thereon, in combination with the feeder at one side of the head of the table extending at right angles thereto, and having independent passages communicating with the channels in the table for feeding one thereto, and a water-pipe for directing the water upon said side of the table, substantially as described.

2. In a concentrator, the combination of the table having its surface divided into a number of independent inclined parallel runs or channels and having a jarring or shaking movement at right angles to the flow of material therein, a feeder at right angles to the table having passages of regularly-increasing lengths, whereby the material is directed into the runs or channels in the table, and the perforated water-pipes on the same side of said runs or channels for discharging water into them on said side, substantially as described.

3. In a concentrator, the combination of the table divided into a number of independent parallel inclined runs or channels and having a jarring or shaking movement at right angles to the flow of the material therein, a perforated distributing-box in the head of each run or channel and at one side thereof, perforated water-pipes in the same side of the runs or channels, and a feeder having independent passages for directing the material into each of the distributing-boxes, substantially as described.

4. In a concentrator, the combination of the table formed with inclined runs or channels and having a jarring or shaking movement at right angles to the flow of the material therein, the perforated distributing-box at the head of each run or channel and at one side thereof, the perforated water-pipes extending the length of said runs or channels and at the same side thereof as the distributing-boxes, the directing-strips M at the base of each run or channel, the discharge-slots m and trough N, substantially as described.

5. In a concentrator, the table formed with he independent inclined runs or channels nd having a jarring or shaking movement t right angles to the flow of material therein, n combination with the distributing-boxes at he head of each run or channel and at one ide thereof, the perforated water-pipes ex-ending the whole length of said runs or hannels and at the same side thereof as he distributing-boxes, the main water-pipe, he connecting-pipes k, and the controlling-ocks k^2, whereby the water supplied to the uns or channels is regulated and controlled, ubstantially as described.

6. In a concentrator, the table formed with ne independent inclined runs or channels nd having a jarring or shaking movement t right angles to the flow of material therein, n combination with the distributing-boxes t the head of each run or channel and at ne side thereof, the perforated water-pipes xtending the length of each run or channel nd at the same side thereof as the distrib-ting-boxes, the main pipe k', the connect-ng-pipes k, and controlling-cocks k^2, and the upplemental water-pipe k^3, having the con-rolling-cock k^4, substantially as described.

7. In a concentrator, the table G, having ne inclined runs or channels, the perforated istributing-box at the head of each run or hannel at right angles and at one side there-f, and the perforated water-pipes at the same de of said runs or channels, in combination ith the sliding roller h', connected with the able, the shaft E, having the cam e operating gainst the roller, the buffers g of the table, ne fixed buffers F, and the springs I, con-ecting said buffers, substantially as de-cribed.

8. In a concentrator, the fixed frame-work rming the foundation, and the adjusting-ame C, mounted thereon and having carry-g-rollers c, in combination with the table , mounted upon said rollers, the parallel uns or channels formed on said table and xtending transversely to the direction of the table's movement, the perforated distribut-ing-boxes J in the head of each run or chan-nel and at one side thereof, the perforated water-pipes K in each run or channel and at the same side thereof, the shaft E on the frame C and the cam on the shaft, the roller on the table G, against which the cam acts, the buffers g of the table, the fixed buffers F of the foundation-frame, and the springs I, connecting the buffers, substantially as de-scribed.

9. In a concentrator, the movable table G and the cam e, operating against it, in com-bination with the sliding roller h, connected with the table and against which the cam acts, and the latch h^2, for holding the roller in place and relieving it, so that it may be thrown out of or into connection with the cam, substantially as described.

10. A concentrating-machine consisting of the combination of the foundation-frame hav-ing the fixed buffers F, the adjusting-frame C, mounted on the fixed frame, and the wedges D, for regulating the inclination of the frame C, the carrying-rollers c on said adjusting-frame, the cam-shaft E, carried by said frame and having the cam e, the table G, mounted on the carrying-rollers of the adjusting-frame and having the buffers g and the roller h', the springs I, connecting the buffers g with the buffers F, the parallel transversely-ar-ranged inclined runs or channels of the table, the distributing-boxes J at the head of each run and at one side thereof, the perforated water-pipes K in each run and at the same side thereof as the distributing-boxes, and the feeder L, mounted on the table at its head and having the passages l for directing the material into the distributing-boxes J, sub-stantially as herein described.

In witness whereof I have hereunto set my hand.

GEORGE GATES.

Witnesses:
S. H. NOURSE,
H. C. LEE.

[Defendant's Exhibit "C"—Drawings and Specifications of Letters Patent No. 149,622, to J. B. Wilder, Patented April 14, 1874.]

[Endorsed]: Mine & Smelter Supply Co. vs. Arizona Copper Co. Defendant's Exhibit "C." Patent to J. B. Wilder, #149,622. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "C." Received Aug. 20, 1913. F. D. Monckton, Clerk.

J. B. WILDER.

Ore-Concentrators and Washers.

No. 149,622. Patented April 14, 1874.

Fig. 1.

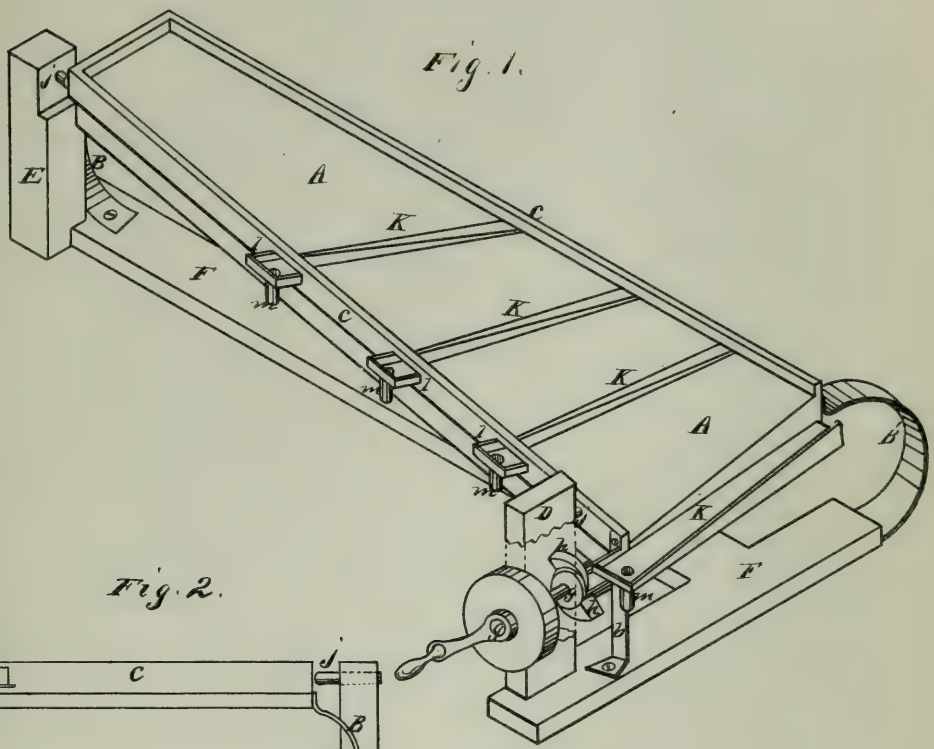
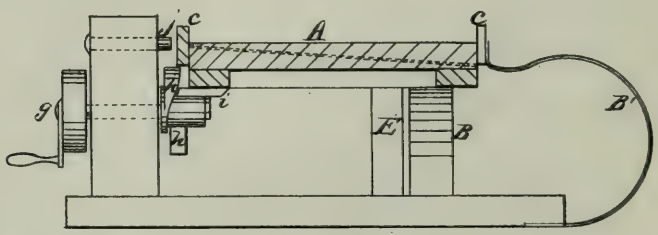
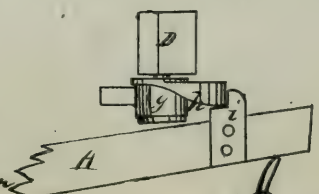


Fig. 2.

Fig. 3.





Witnesses
John L Borne
C. Milton Richardson

Jonas B. Wilder
by Dewey & Co
Attys

UNITED STATES PATENT OFFICE.

JONAS BROOKS WILDER, OF SONORA, CALIFORNIA.

IMPROVEMENT IN ORE CONCENTRATORS AND WASHERS.

Specification forming part of Letters Patent No. **149,622**, dated April 14, 1874; application filed December 23, 1873.

To all whom it may concern:

Be it known that I, J. B. WILDER, of Sonora, Tuolumne county, State of California, have invented an Improved Concentrator; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvement without further invention or experiment.

My invention relates to an improved table or sluice section for concentrating the heavy portions of pulp or pulverized ore by the wet process.

My improvement consists in mounting the table or sluice section upon springs, and then imparting to it a forward and side motion by a cam, so that when it is released from the cam the springs will force it back against two abutments, by which a compound jar will result. These abutments are so arranged that the direction of the combined concussion will be in a line diagonally across both the face of the table and the course of the moving pulp, so that the sulphurets and heavy particles of metal will be forced in a line with the line of concussion, while the lighter portions are carried off by the water.

In order to more fully illustrate and explain my invention, reference is had to the drawings accompanying this specification, in which—

Figure 1 is a perspective view of my invention. Fig. 2 is a side view near one end. Fig. 3 is an end view.

A represents a table or sluice section, which is mounted upon the C-springs B B′. One of these springs, B′, supports the rear end of the table, while the other, B, supports one corner of the forward end, as shown. An ordinary spring-leg, *b*, supports the opposite forward corner. The table has side boards *c*, in the manner of constructing an ordinary sluice. A post, D, is secured to the base or foundation timber E on the side of the table opposite the spring B′, while another post, F, is secured at its rear end. A shaft, *g*, passes through the post D, and carries, at its inner end, and directly below the table, a double cam, *h*. The arms of this cam are made bevel-ing on the inside, so that when they are revolved so as to strike the tappet *i*, on the under side of the table, it will give both a forward and side motion to the table, the curved face of the cam forcing the table forward, while the side bevel forces it to one side. Abutting points *j j* are secured to the posts E D, so that when the table is released from the cam the springs will drive it back against them simultaneously, and thus give a compound jar or thump to the table. As will be readily seen, the concussion produced by this compound jar will be in a line diagonal to the length of the table, the angle of concussion becoming greater toward the rear end of the table. Across the face of the table I make two or more inclined channels, K K, the shallow portion being at the discharge side of the table. An opening through the side of the trough, at the lower end of each channel, permits the water and lighter portions to escape, while a similar opening through the opposite side allows the sulphurets to pass out into a pan, *l*, from which they will be conveyed by a pipe, *m*, to any receptacle prepared for them. The concentrating-table can be set at any desired angle. The pulp is fed upon the upper end of the table, and flowing down it is arrested by the channels K K. The compound jar then causes the sulphurets and heavy portions of the pulp to travel up the channels into the discharging pan and spout, while the water will carry off the gangue and lighter portions through the opposite side.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

The concentrating table or sluice section A, provided with inclined diagonal grooves or channels K K, and mounted upon springs B B′ *b*, in combination with the double inclined cam *h* and abutments *j j*, substantially as and for the purpose above described.

In witness whereof I hereunto set my hand and seal.

JONAS BROOKS WILDER. [L. S.]

Witnesses:
EDWIN A. RODGERS,
H. B. MCNEIL.

[Defendant's Exhibit "D"—Drawings and Specifications of Letters Patent No. 528,503, to R. L. Chatterson, Patented October 30, 1894.]

[Endorsed]: Mine & Smelter Supply Co. vs. Arizona Copper Co. Defendant's Exhibit "D." Patent to R. L. Chatterson, #528,503. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "D." Received Aug. 20, 1913. F. D. Monckton, Clerk.

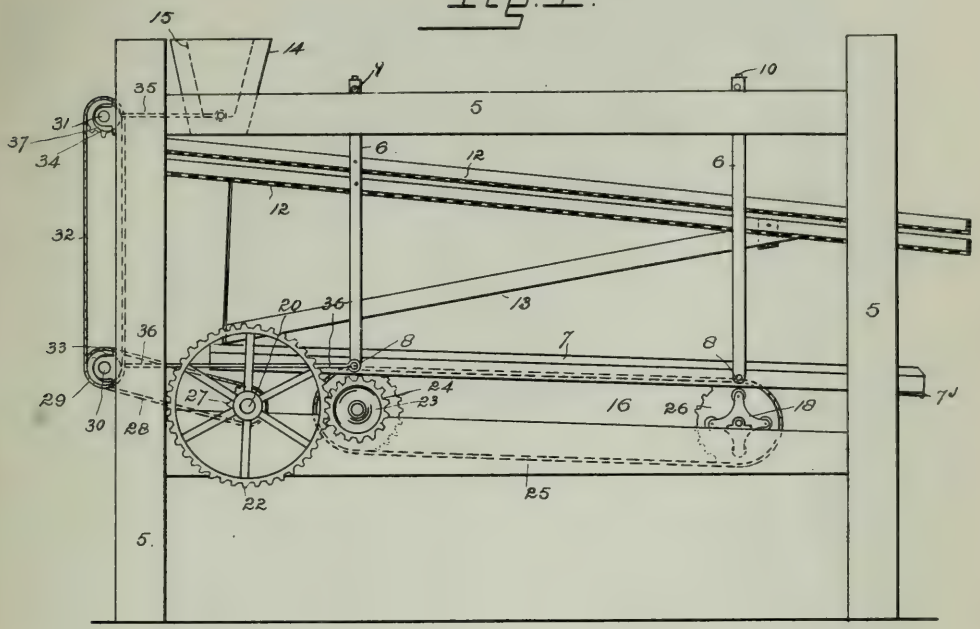
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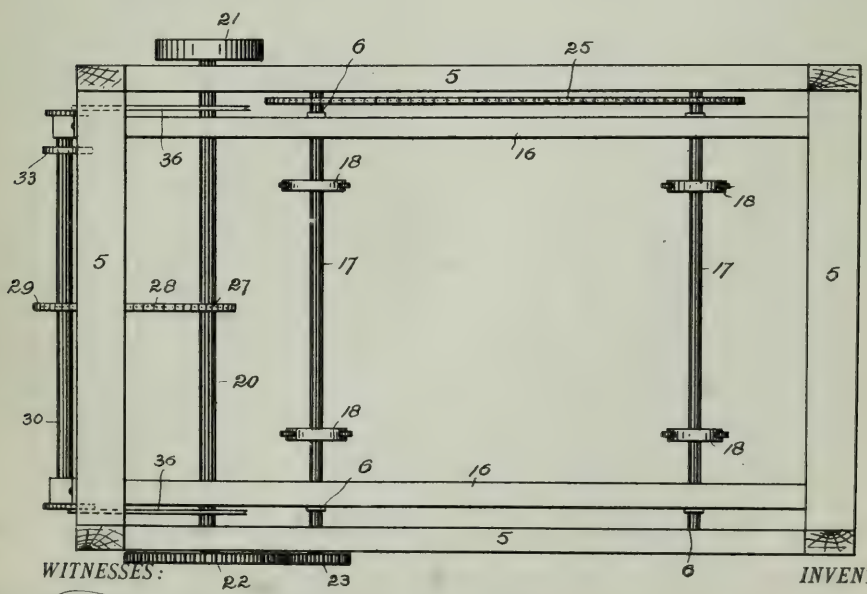
R. L. CHATTERSON.

PLACER MACHINE.

No. 528,503. Patented Oct. 30, 1894.

Fig. 1.





WITNESSES:

C. J. Dellamuit

Chas. E. Dawson

Fig. 2.

INVENTOR

R. L. CHATTERSON.

BY A. J. O'Brien

ATTORNEY

(No Model.) 2 Sheets—Sheet 2.

R. L. CHATTERSON.

PLACER MACHINE.

No. 528,503. Patented Oct. 30, 1894.

Fig. 3.

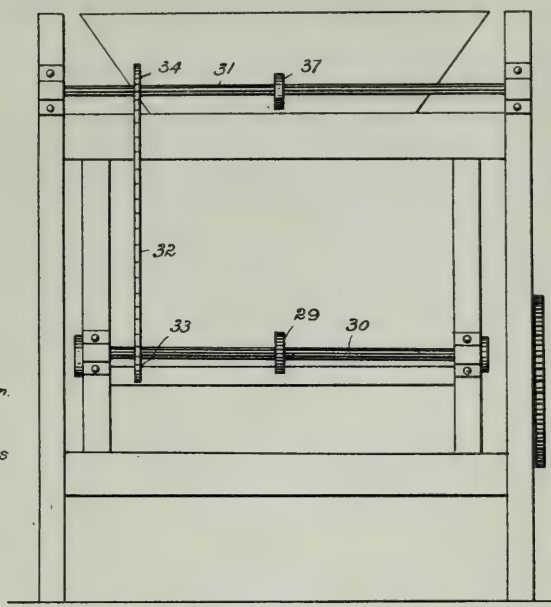
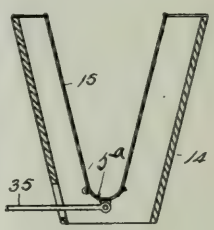


Fig. 6.



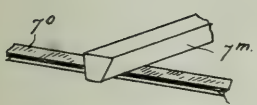


Fig 10.

Fig. 4.

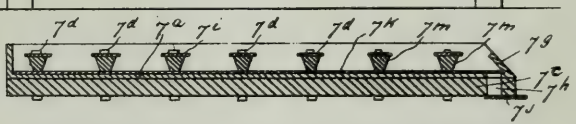
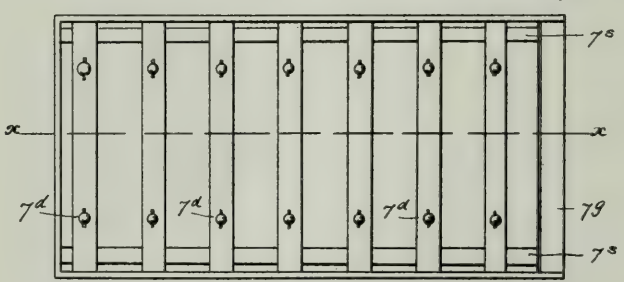


Fig. 5.



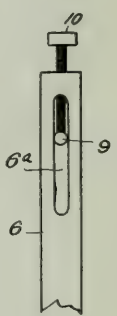
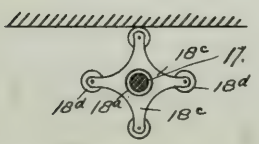
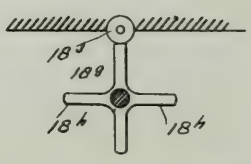


Fig. 7.





WITNESSES:

C. J. Dellamere

Chas. E. Dawson

Fig. 8.

Fig. 9.

INVENTOR

R. L. CHATTERSON.

BY

A. J. O'Brien

ATTORNEY

UNITED STATES PATENT OFFICE.

ROBERT L. CHATTERSON, OF DENVER, COLORADO.

PLACER-MACHINE.

SPECIFICATION forming part of Letters Patent No. 528,503, dated October 30, 1894.

Application filed May 25, 1894. Serial No. 512,401. (No model.)

To all whom it may concern:

Be it known that I, ROBERT L. CHATTERSON, a citizen of the Dominion of Canada, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Placer-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in machines for treating placer material; and is specially designed for handling adobe soil which is often richest in precious metals. This adobe material is very difficult to treat for the reason that the clay will not readily break up but remains in chunks called "gold thieves," since the gold adheres thereto and cannot be separated therefrom except by dissolving or thoroughly disintegrating and breaking up these clayey formations.

To this end, my improved machine is a combined concentrator and amalgamator.

I first concentrate by using burlap or suitable fibrous material on the bottom of the separating pan. This burlap allows the gold to hide in its meshes during the process of breaking up, separating and removing the adobe portion of the material. Below the burlap is the amalgamated copper bottom of the pan, which is protected by the burlap during concentration. Hence, when I am ready to amalgamate, I remove the burlap from the pan and replace the riffled frame, which then rests upon or engages the amalgamating plate.

My improved machine consists further of the features, arrangements and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation of the machine. Fig. 2 is a top or plan view of the same, with the pan, screens and trough removed to show the cam shafts and propelling mechanism. Fig. 3 is an end elevation of the machine. Fig. 4 is a vertical longitudinal section taken through the separating pan. Fig. 5 is a plan view of the same. Figs. 6, 7, 8, and 9 illustrate details of construction. Fig. 10 is a fragmentary view in perspective, illustrating the riffle-frame of the separating pan.

Similar reference characters indicating corresponding parts or elements of the mechanism in these views, let the numeral 5 designate the main framework of the machine composed of the vertical posts, and the longitudinal and transverse bars connecting the posts. Hung on this framework and supported by metal straps 6 attached to the longitudinal top bars, is an oscillating separating pan 7. The lower extremities of the straps 6 are pivoted to the pan as shown at 8. The upper extremities of the straps are provided with slots 6^a through which pass the horizontal suspension rods 9 made fast to the top bars of the frame. In the tops of the straps 6 are inserted the adjusting screws 10 which enter the slots and engage the rods. The straps, and consequently the separating pan, are raised and lowered by these screws. The ultimate function of these screws is to regulate the elevation of the pan with reference to the rotating cams engaging the pan underneath, and hereinafter described.

Above the pan 7, and also attached to the straps 6, are two parallel inclined screens 12 arranged one above the other, and an oppositely inclined trough 13 located under the screens. The function of this trough is to convey the screened material to the upper extremity of the pan. This trough is hinged at one extremity and supported by straps at the opposite extremity, the connection being such that it may be raised up out of the way while cleaning up. The screens are attached to the straps 6 and oscillate with the pan.

The screens 12 reject the bowlders and coarse rock portion of the gangue, and break up the adobe material fed thereto with the material from the hopper 14, in which is hinged a movable false hopper 15 composed of a screen-basket of such mesh as is best calculated to disintegrate and assist in the dissolution of the adobe portion of the material.

Underneath the pan 7, and journaled in beams 16 made fast to the framework, are two shafts 17 carrying the spider-shaped cams 18. These cams are composed of central web

portions 18^a (see Fig. 8,) from which, project arms 18^c carrying rollers 18^d. As the shafts 17 are rotated, the roller extremities of the cams engage the bottom of the pan 7, and impart thereto a vibratory movement in addition to the oscillating movement hereinafter described. The extent of the movement given by the cams is controlled and regulated by the screws 10 heretofore mentioned.

The separating pan 7 is composed of a wooden bottom 7^c, an amalgamated copper plate 7^a, a burlap covering 7^k for the plate, and a series of transverse riffles 7^m placed upon the burlap. The body portion of the riffles is composed of wood bars having inclined sides. These riffled bars are narrowest at the bottom, and gradually increase in size toward the top. To the upper surface of each riffle is attached a metal plate 7^l which is wider than the top of the riffle, and projects thereover on either side. The riffles are attached in any suitable manner to two metal strips 7^s upon which a strip of rubber 7^o is placed before the riffles are attached. This rubber engages the bottoms of the riffles. This riffled frame is secured to the separating pan in such a manner that it is readily detachable to permit the removal from or the attachment to the copper lining of the pan, of the burlap covering, in changing the machine from a concentrator to an amalgamator; and vice versa.

As shown in the drawings, the riffled frame is held in place by bolts which pass up through the bottom of the frame and through the riffles, being secured by thumb nuts 7^d applied to the upper extremities of the bolts.

The lower extremity of the pan is turned upward and bent inward as shown at 7^g. The lower end of the pan is provided with an outlet 7^h controlled by a slide 7^j. By moving this slide and opening the outlet, the concentrates may be drawn off into a suitable receptacle.

Power is applied to the machine by rotating a shaft 20 journaled in the beam 16 and provided with a fast pulley 21 which may be connected by a belt with any suitable motor. The opposite extremity of the shaft 20 is provided with a fast gear wheel 22, which meshes with another gear 23 fast on one of the cam shafts 17. To the extremity of the shaft opposite from the gear 23 is made fast a sprocket wheel 24 which is connected by means of a chain 25 with a sprocket 26 fast on the other cam shaft 17. To the shaft 20 is also attached a small sprocket wheel 27 connected by a chain 28 with another sprocket 29 on a shaft 30 journaled in the front end of the machine, or that shown at the left in Figs. 1 and 2.

The shaft 30 is connected with a shaft 31 located directly above, by means of a chain 32 engaging sprockets 33 and 44 on the respective shafts. The false hopper 15 is actuated from the shaft 31 by means of a pitman 35 leading from an eccentric 37 on the shaft. The oscillating movement is imparted to the separating pan from the shaft 30 by means of two pitmen 36 which are connected with two of the hangers 6.

In Fig. 9 I have shown a modified form of cam construction for imparting the vibratory movement to the pan 7. In this form, the cam, which I will designate as 18^s, is composed of arms 18^h made fast to a hub mounted on the shaft 17. The outer extremities of these arms engage a roller 18^j journaled in the bottom of the pan, thus securing a result similar to that obtained from the cam shown in Fig. 8.

From the foregoing description of the mechanism, its operation will be readily understood.

The material to be treated is fed into the hopper in any suitable manner. By applying power to the machine in the manner heretofore explained, a shaking movement is imparted to the false hopper which is hinged to the top of the stationary hopper. A suitable quantity of water is fed to the hopper simultaneously with the discharge thereinto of the material to be treated. This shaking movement of the false hopper has for its object, the breaking up and disintegration of the adobe material. From this hopper, the material passes to the screens 12, which further disintegrate the adobe material, and separate the coarser part of the rock and gangue. After passing through the screens, the material drops into the trough 13 and is carried thereby to the front end of the separating pan, in which it is subjected to the influence of the combined oscillating and vibratory movements imparted to the pan by the pitmen 36 and the cams 18. The concentrates collected in this pan are drawn off through the opening 7^h as heretofore described. When it is desired to amalgamate the concentrates thus collected, the thumb nuts 7^d are removed, the riffle frame lifted out of the pan, the burlap covering of the pan removed, and the copper plates charged with mercury. The riffle frame is then replaced and fastened, the concentrates placed in the pan, and the operation of the machine continued.

To facilitate the removal of bowlders or other coarse rocky material which will not pass through the meshes or apertures of the false hopper, I have provided this hopper with a hinged bottom 15^a which may be opened at intervals for the purpose of releasing such coarse rocky gangue as cannot otherwise escape. This hinged bottom may be controlled in any suitable manner from the outside of the hopper.

Having thus described my invention, what I claim is—

1. In a concentrator, the combination with the stationary frame, the movable pan, the supporting hangers movably attached to the pan, the rods passed through the upper part of the frame, the upper extremities of the hangers being vertically slotted to receive

the said rods, adjusting screws passed through threaded apertures formed in the top of the hangers and extending to the slots whereby the screws are adapted to engage the rods, two shafts 17 passed through the lower part of the frame and carrying cams adapted to engage the bottom of the pan, a main shaft 20, and another 30, journaled in the frame, pitmen connecting the hangers with the shaft 30, and suitable connections whereby motion may be transmitted from the shaft 20 to the shafts 17 and 30, as and for the purpose set forth.

2. In a concentrator, the combination with the stationary frame, of the movable pan, hangers attached to the pan at one extremity and to the frame at the opposite extremity, the upper part of the hangers being slotted vertically to receive supporting rods passed through the frame, adjusting screws passed through apertures formed in the top of the hangers and communicating with the slots, whereby the screws are adapted to engage the rods, shafts 17 passed through the lower part of the frame and carrying cams adapted to engage the bottom of the pan, shafts 20, 30 and 31 journaled in the frame, pitmen leading from shaft 30 to the hangers supporting the pan, a stationary hopper support in the framework, a false hopper movably supported in the stationary hopper, said false hopper being adapted to screen the material, a pitman leading from shaft 31 to the false hopper, and suitable connections between shafts 20, 17, 30 and 31, whereby the requisite motion may be transmitted from shaft 20 to the pan and the false hopper, as and for the purpose set forth.

3. In a concentrator, the combination with the stationary frame, of the pan provided with riffles, the hangers attached to the pan at one extremity and to the frame at the opposite extremity, shafts 17 journaled in the lower part of the frame and carrying cams engaging the bottom of the pan, said shafts being suitably connected, a main shaft 20 to which power is applied, a shaft 30 journaled in the frame, means leading from the shaft for imparting the oscillating movement to the pan, and means for connecting shafts 30 and 17 with shaft 20 whereby the rotation of the last named shaft communicates motion to the other shafts, substantially as described.

4. In a concentrator, the combination with the stationary frame, of the pan carrying the riffle-frame, the hinged, inclined trough located above the pan, the screen located above the trough, the hangers attached to the pan at one extremity, and to the frame at the opposite extremity, shafts journaled in the lower part of the frame and carrying cams engaging the bottom of the pan, said shafts being connected by chains engaging sprockets on the shafts, a main shaft 20 to which the power is applied, a shaft 30, pitmen connecting the shaft 30 with the hangers supporting the pan, and means for connecting shafts 30 and 17 with shaft 20, whereby the requisite movements may be imparted to the pan, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

ROBERT L. CHATTERSON.

Witnesses:

G. J. ROLLANDET,

CHAS. E. DAWSON.

[Defendant's Exhibit "E"—Drawings and Specifications of Letters Patent No. 526,242, to L. Look, Patented September 18, 1894.]

[Endorsed]: Mine & Smelter Supply Co. vs. Arizona Copper Co. Defendant's Exhibit "E." Patent to L. Look, #526,242. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "E." Received Aug. 20, 1913. F. D. Monckton, Clerk.

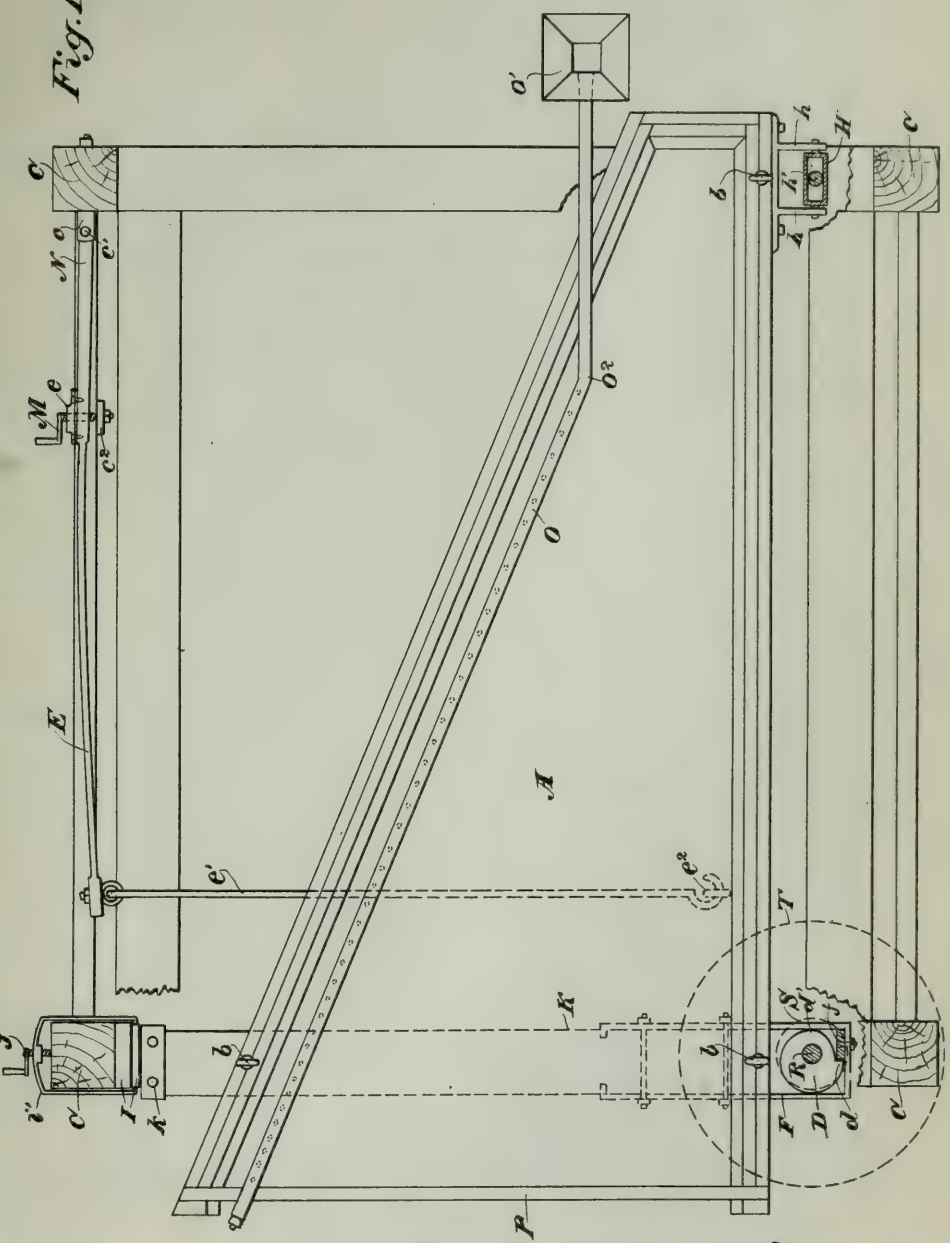
(No Model.) 2 Sheets—Sheet 1.

L. LOOK.

ORE CONCENTRATOR.

No. 526,242. Patented Sept. 18, 1894.

Fig. 1.



Witnesses;
H. Howson
H. F. Ascheck

Inventor;
Luther Look
By Dewey & Co.
Attys

L. LOOK.

ORE CONCENTRATOR.

No. 526,242. Patented Sept. 18, 1894.

Fig. 2.

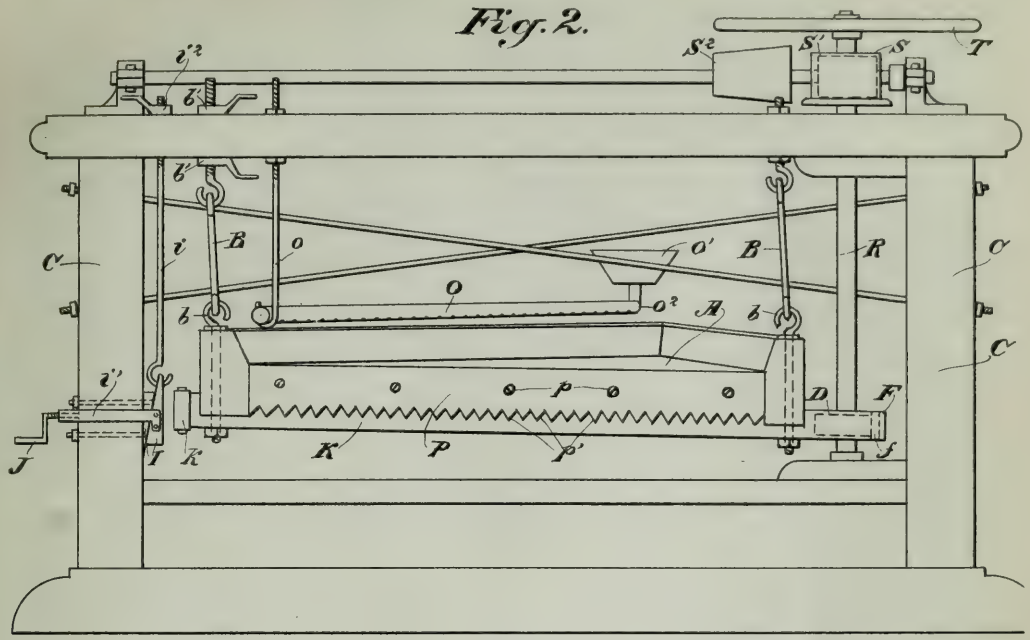


Fig. 3.

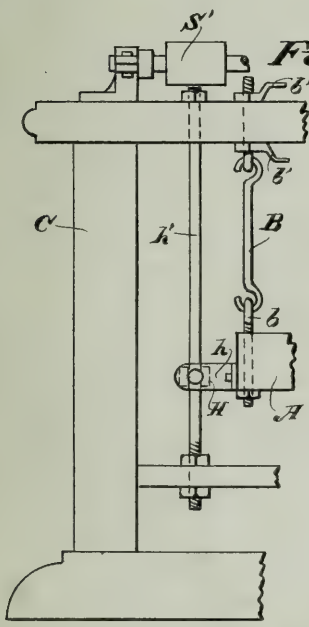


Fig. 4.

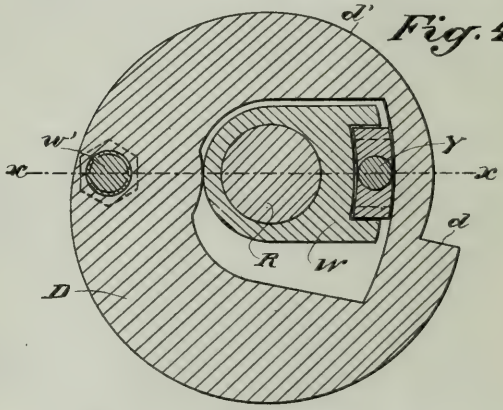


Fig. 5.

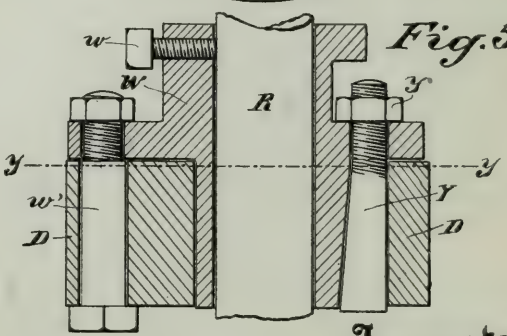
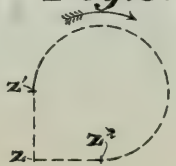


Fig. 6.



Witnesses,
L. Burse
H. F. Ascheck

Inventor,
Luther Look
By Dewey & Co. Attys

UNITED STATES PATENT OFFICE.

LUTHER LOOK, OF SOLDIER, IDAHO.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 526,242, dated September 18, 1894.

Application filed November 24, 1893. Serial No. 491,880. (No model.)

To all whom it may concern:

Be it known that I, LUTHER LOOK, a citizen of the United States, residing at Soldier, Logan county, State of Idaho, have invented an Improvement in Ore-Concentrators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of concentrators in which eccentric movements are imparted to a table, and especially to that type commonly known as "percussion or bumping tables."

My invention consists of a table having imparted to it, at one end, a circular swinging motion, combined with a side bump, and at the other end a reciprocating end shake or motion.

It also consists in the novel means for imparting said motions and bump and varying them relatively according to the needs of the machine; and it finally consists in the novel details of construction, arrangement and combination relating to the table, and other parts, all of which I shall hereinafter fully describe and specifically claim.

The general object of my invention is to provide by the peculiar motion at the head of the table, for the effective feed of the pulverized ore, thereby increasing the capacity of the machine and improving the quality of the result, and by the swinging motion and the bump at the other end of the table to produce an effective settling action similar to the action of a gold pan, and to draw the mineral to one side as fast as it is settled, the whole resulting in the continuous and automatic discharge of the different classes of concentrates and the tailings.

Referring to the accompanying drawings for a more complete explanation of my invention,—Figure 1 is a top view of my concentrator. Fig. 2 is an elevation of the lower end of same. Fig. 3 is an elevation of one corner of the upper end. Fig. 4 is a horizontal section of the variable eccentric D. Fig. 5 is a vertical section of same on line x—x of Fig. 4. Fig. 6 is a diagram showing the movement of the lower end of the table.

A is the table which, as shown in Fig. 1, is preferably triangular in shape, which form greatly facilitates its successful working at the same time that it economizes material. This table is made preferably of wood, and is covered with suitable material to make a proper concentrating surface. A thin sheet of rubber or of water-proof canvas will serve the purpose, for to these materials the fine mineral particles adhere well. The rubber sheet or waterproof canvas surface also prevents the water from coming in contact with the wooden frame and bottom of the table. The table is suspended from the top part of the frame by means of eye bolts b (Fig. 2) and hanger rods B (Figs. 1, 2 and 3). The table is supported by three of these hangers, as indicated in Fig. 1, one at the upper or head end, and one at each of the two lower corners. The upper eye-bolt b at the head of the table, and also that at the side where the mineral or concentrates are discharged are provided with hand screws or thumb-nuts b' for the purpose of adjusting the incline of the table in the direction of its length, and also laterally, the table being higher at the head or feed end and also at the side where the concentrates are discharged.

C are the corner posts and sill portions of the frame which supports the table A.

D is an adjustable or variable eccentric cam. This cam, in connection with the spring E, produces the different motions of the table. A horizontal section of the eccentric cam is shown in Fig. 4, and a vertical section of same is shown in Fig. 5.

The construction and adjustment of the eccentric cam are as follows: At W (Figs. 4 and 5) is shown a portion of the eccentric cam which is fastened rigidly to the shaft R by means of set screws, as at w in Fig. 5. The top or flange portion is omitted in Fig. 4, for the purpose of showing the lower part of the same. The adjustable portion of the eccentric cam is shown by D. This part is pivoted to the rigid portion by means of the bolt or pin w'. The center of the adjustable part D is cut away, as seen in Fig. 4, to allow it to swing laterally on the rigid portion W between certain limits.

Y shows a tapering key with a set or lock nut y at the top. To adjust the eccentric cam, the nut y and key Y are loosened; the eccentric cam is then swung on the pivot pin w' to the point required, and then the key and nut are tightened to hold them in place.

By these means the eccentric cam may be given any amount of throw required from nothing up to an inch or more. When the notch at d, the center of the key Y, and the center of the pin w' are in line, the eccentric cam has no throw, except that permitted by the tapering notch d, d' while as shown in Fig. 4, it has the full stroke. This eccentric cam is cut away at d, shown in Fig. 4, and the notch gradually tapers to point d', where it runs out and the circle of the eccentric is complete the other three-fourths of the circumference.

At F, Figs. 1 and 2, is shown a box or stirrup in which the eccentric cam revolves and by which motion is given to the table. The eccentric cam revolves freely in this box and has a bearing on three sides at different parts of the revolution, the side toward the table being open as the cam does not touch it at any part of the stroke.

At f (Fig. 1) is a lug or block bolted on the box or stirrup F on the inner side, and this lug is equal in length to one-half the diameter of the eccentric cam, and is as thick as the depth of the notch or offset d in the periphery of the eccentric cam. This box or stirrup F extends under the table and is bolted to the side of the bumping bar K.

E (Fig. 1) is a spring, preferably made of wood which is supported at the end N by two lugs c bolted to the post C of the main frame. Should this spring become bent from use, it can be reversed and used again. A pin c' passes through the lugs c and the end of the spring, and the latter can turn on this pin as a pivot. A hand or crank screw M passes through a nut e fastened to the spring, and the end bears against a lug c^2 fastened to the side of the main frame. By means of a hooked rod e' the spring is attached to the table A and draws laterally from an eye bolt e^2 attached to the under side of the table. As the hand screw M is tightened, the lug or block f on the stirrup F is drawn against the edge of the eccentric cam D at all parts of the stroke, except in the notch d. The bumping bar K, to which the cam stirrup F is bolted, extends across the under side of the table to which it is bolted, and projects beyond the edge of the table, and is bound with an iron band k to prevent it from splitting (Fig. 2).

At I (Figs. 1 and 2) are shown two metal wedges or bumping blocks. These blocks are designed to regulate the length of the lateral bump of the table. The inner one is bolted rigidly to the post C with the thin end of the wedge down; while the outer wedge which is suspended from the top of the frame by a hooked rod i has the thick end down, and has a stirrup or bail i' bolted to the edges and extending around the corner post C. A hand or crank screw J passes through the center of this bail with the point of the screw bearing against the outer or opposite side of the corner post from the wedges. By loosening the hand screw J, and raising the outer wedge I by means of the thumb or wing nut i^2 the outer wedge is forced farther from the post by the inclined slope of the inner wedge, which shortens the lateral bump of the table, when the crank screw is again tightened which makes the bumping wedges equivalent to a part of the solid post.

At H (Figs. 1 and 3) is a slotted roller supported by two lugs h which are bolted to the side of the oscillating table near the head end. A stout rod h' which is supported at each end by the main frame, passes vertically through the slot in this roller H, and serves as a pivot, and also as a guide for the upper or head end of the table.

At O (Figs. 1 and 2) is shown a perforated pipe which extends along the inclined or sloping side of the table near the edge, and is supported by hangers o from the frame above. It does not touch the oscillating table or come in contact with it at any point. It is designed to supply clear water to that side of the table, when the table is in operation, and may be made in sections for convenience in transportation. It is provided with a funnel o' at the head, to take the water the more readily, and the perforations extend from the point o^2 (Fig. 1) to the lower end of the table.

Fig. 6 shows an outline of the figure produced at the lower end of the table by one revolution of the eccentric cam D. Start at the point Z with the bumping bar K held firmly against the bumping blocks I by the spring E. The notch d on the eccentric cam D has just passed the lug f on the inner side of the cam box or stirrup F. The first quarter of a revolution of the eccentric cam carries the oscillating table to the point Z' on the outline of the figure. During the next three-fourths of the revolution, the outline of the figure produced by the table at and near the eccentric cam, is more or less of a circle, with a diameter equal to the throw of the eccentric. When the notch d on the eccentric cam has come past the lug f on the inner side of the cam box F, the lug is drawn into the notch by the tension of the spring E, and the outline of the figure 6 from Z^2 to Z is completed. Different adjustments will produce different figures. By raising the adjustable bumping block I to its full height, the lug f will be held from dropping into the notch d, and the table will have no side bump, and the figure of revolution will be a half circle, with a diameter equal to the throw of the eccentric. When the eccentric is adjusted to have no throw, and the adjustable bumping block I is lowered to the lowest point, the outline of the figure will be almost a straight line laterally. In other words it will be all side bump and no end shake. The upper or head end of the table is prevented by the slotted roller H and the rod h' from having any lateral or side motion or bump, the motion at this point being an almost straight end shake. The outline of the figure of revolution pro-

duced at different points on the length of the table will be different, being a straight line in the direction of its length at H, and a more or less complete circle at the cam box F. By adjusting the eccentric cam to the center of the shaft, and the bumping block I to the highest point, there will be neither end nor side shake.

At P (Figs. 1 and 2) is shown an apron-board which is designed to hold the rubber or canvas covering of the table securely in place at the lower end. It is held in place by screws p and the lower edge extends down below the other parts of the oscillating table, and is notched or serrated along the lower edge, as shown at p'. These notches or saw teeth prevent the water and sand or ore from traveling laterally to the lowest side of the table. The upper end of the table is to be provided with a feed hopper with a perforated bottom. This is not shown. This feed hopper distributes the pulverized ore evenly and smoothly over the upper end of the table.

The operation of the machine is as follows—The pulverized ores are fed on to the oscillating table at the upper or narrow end, through the perforated hopper, and are moved down the table by the combined action of the flow of the water due to the incline and the end shake action of the table at this end. As the ores move down, they come more under the influence of the side shake and the side bump. These two motions, combined with the end shake, produce the oscillating or circular swinging motion before described. This oscillating motion loosens up the pulverized ores, and keeps them "alive" which allows the minerals which have greater specific gravity than the quartz, sand, or gangue, to settle through the sand, until they get to the bottom, in contact with the rubber or waterproof covering of the table. The downward motion of the mineral is now retarded, while the effect of the side bump is increased, causing the mineral and sand to move gradually toward the side at which the bump takes place, while moving downwardly; but the mineral moves laterally at a faster rate than the sand, and is drawn from under it, while the sand is held back by the backward and downward action of the water from the jets of the clear water pipe at that side. This action continues on down to the lower end; the bumping action holding the mineral near the side under the jets of clear water, the oscillating action settling the mineral and causing the lighter sand to come to the surface, and the clear water holding the lighter sand and gangue back and moving it down to the lower end of the table. The side of the table at which the bump takes place is raised slightly higher by means of the adjustable hanger at that side, than the opposite side. This causes the clear water from the jets to move downward and laterally in the opposite direction, and assists in holding the sand back. By the time the mineral and sand have reached the lower end of the table, the separation is very complete, so much so that minerals of different specific gravities can be separated from each other. Motion is given to the cam shaft R through the pulleys S, S′ and S^2. A fly-wheel is provided at T. Suitable sliding boxes or troughs are to be provided for conveying away the different minerals from the lower end of the machine, and also for carrying away the tailings.

The effect of the serrated edge of apron P may be fully described as follows:—The table being inclined laterally, the mineral particles and the sand travel upwardly toward the bumping side of the table. The mineral particles travel faster and thus separate from the sand; but the down flowing water which should drop off clean and perpendicularly from the lower edge of apron P, would not do so if said edge were smooth, but would cling to and run along down the edge and thus would tend to carry the mineral particles back again to the sand; but by reason of the toothed edge of the apron, the water, and the separated materials all drop off clean and sharp.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the freely swinging triangular table or bed provided with suspension devices and having a pivotal longitudinally sliding connection at its head end, of a horizontally turning notched cam at one side of the foot end of the table, a strap or bearing on the table in which said cam works, a bumper at the opposite side of the table from said cam, a spring throwing the table transversely toward the bumper, and against the action of which the cam works, substantially as herein described.

2. The combination with the freely swinging triangular table or bed provided with suspension devices, one or more of which are adjustable to regulate the inclination of the table said table being provided at its head end with a pivotal longitudinally sliding connection preventing lateral sliding at that end, and a shouldered strap or bearing at one side of the opposite end of the said table, of a horizontally turning notched cam in the strap or bearing, a bumper in the path of the table opposite the cam, and a spring throwing the table toward the bumper and against the action of which said cam works, substantially as herein described.

3. The combination with the table and its shouldered strap or bearing, of the operating shaft and a two-part cam thereon, one section of which is rigidly secured to the shaft and the other section of which has a slot or opening receiving said first part, the two sections being pivotally connected beyond the shaft, and means for adjusting the two sections relatively one to the other; the outer section having a circular periphery provided with a notch, whereby by adjusting the said sections

the outer section may be made concentric or eccentric to the said shaft, substantially as herein described.

4. In an ore concentrator, the cam consisting in the outer section D, having a circular periphery provided with a notch $d\,d'$ and with an opening or slot, and the inner relatively stationary section W apertured to receive the shaft, lying within the said slot or opening and pivoted therebeyond to the outer section as at w', and the wedge bolt y, working between the two sections to clamp the outer section D to the section W eccentric or concentric to its shaft opening, substantially as herein described.

5. In an ore concentrator, the swinging substantially triangular inclined concentrating table or bed, in combination with the means for imparting to the foot end thereof a substantially circular motion and a side bump, consisting of the stirrup on one side of the table having a lug within it, the adjustable notched eccentric cam operating within said stirrup, the spring on the other side of the table, or bed, and the adjustable bumper wedges I and bumper bar K on said side, substantially as herein described.

6. In an ore concentrator, the swinging substantially triangular inclined concentrating table or bed, in combination with the means for imparting to the foot end thereof a substantially circular motion and a side bump, consisting of the stirrup on one side of the table having a lug within it, the adjustable notched eccentric cam operating within said stirrup the spring on the other side of the table, or bed, and the adjustable bumper wedges I and bumper bar K on said side, and the means for imparting an approximately lineal reciprocation to the other end of the table or bed, consisting of the slotted roller secured thereto and the guide rod passing through the roller, substantially as herein described.

7. In an ore concentrator having a percussion table or bed, the bumper blocks, consisting of the fixed wedge, the movable oppositely inclined wedge operating on the face of the fixed wedge, the hanger with thumb nut for adjusting the movable wedge and the bail with set screw for setting said wedge, substantially as herein described.

8. In an ore concentrator having the inclined shaking concentrating table or bed, the apron strip P at the lower end or foot of the table or bed, and having the serrated or notched edge, substantially as herein described.

In witness whereof I have hereunto set my hand.

LUTHER LOOK.

Witnesses:
W. FINNEY,
S. A. CLUER.

[Defendant's Exhibit "F"—Drawings and Specifications of Letters Patent No. 349,504, to H. C. Krause, Patented September 21, 1886.]

[Endorsed]: Mine & Smelter Supply Co. vs. Arizona Copper Co. Defendant's Exhibit "F." Patent to H. C. Krause, #349,504. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "F." Received Aug. 20, 1913. F. D. Monckton, Clerk.

UNITED STATES PATENT OFFICE.

CHARLES F. PIKE, OF PHILADELPHIA, PENNSYLVANIA.

ORE WASHER AND SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 566,534, dated August 25, 1896.

Application filed March 4, 1895. Serial No. 540,402. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. PIKE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain new and useful Improvements in Ore Washers and Separators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters of reference marked thereon, which forms a part of this specification.

My invention has relation to ore washers and separators or concentrators, and more particularly to that class of apparatus or machines adapted to the working of placer-gravel.

It has long been known that placer-gravel cannot be profitably worked except by a rapid treatment of large quantities of the material, while it is essential that said material should be thoroughly washed.

In rapidly treating large quantities of placer-gravel the black sand contained therein accumulates very rapidly and fills and packs in the riffles, which then become inoperative, the metal passing off the riffled plate with the successive accumulations as soon as the riffles are packed with such sand. This difficulty I have effectually overcome, and am enabled to thoroughly wash the ore, by immersing the screen or screens, as well as the riffled plate beneath the same, in a body of confined water, in contradistinction to the use of running water, and by imparting to said screen or screens and riffled plate a reciprocating or jigging motion in the direction of their length, whereby the material on the screens and riffled plate receive successive short forward movements, thereby scattering said material and keeping the same alive in the body of water, enabling the particles of metal to freely separate from the gravel and black sand and subside, said particles of metal passing with the black sand from the screens to the riffled plate, where the metal is concentrated by the riffles, as fully described in Letters Patent of the United States granted to me under date of November 13, 1894, No. 529,307.

Although the results obtained by the method of treatment referred to could not be obtained by any of the older methods, in that I have been enabled to separate and recover such of the finer or lighter particles of metal which could not be recovered by the said older methods of operation or treatment, I have since discovered that the separation may be made still more complete without lessening the quantity of material treated, and without decreasing the rapidity with which said material is treated. This I attain by imparting to the riffled plate a rising-and-falling motion, as well as a longitudinal reciprocating motion, whereby the black sand on the plate is more effectually kept alive, in that it is kept in constant motion, the riffled plate rising during its backward movement and falling during its forward movement, imparting an additional impulse to the material thereon that tends to more thoroughly scatter the same in the body of water, thereby facilitating the separation and subsidence of the particles of metal.

My invention therefore consists in imparting to the riffled plate a jigger motion, and simultaneously therewith a rising-and-falling or vertically-oscillating motion, in a body of confined water, as will now be fully described, reference being had to the accompanying drawing, in which I have shown by a vertical section an ore washer and separator or concentrator embodying my invention.

A indicates a suitable vessel adapted to contain a body of water. S S′ S² are the screens, and R the riffle-plate below said screens, the upper screen S having the coarsest mesh and the lower screen S² the finest mesh. The screens and riffled plate are journaled near their rear and forward ends to two pairs of levers *l* and *l′*, respectively, and receive a reciprocating motion from an eccentric E, connected by rod *r* with one of the levers *l*.

Any suitable discharging device may be provided for the removal from vessel A of the tailings, and the screen and riffled-plate tailings, *i. e.*, the gravel and black sand, may be removed together or separately. For instance, the screen-tailings may be discharged into a separate receiver within vessel A and discharged by a suitable conveyer C, while the black sand may be separately discharged by means of a suitable suction device, for in-

stance, as described in Letters Patent above referred to, and as these devices do not form a part of this invention I have not deemed it necessary to illustrate the suction device or describe either discharge device in detail. The ore or placer-gravel is fed to the head of the upper screen S from a feed chute or trough T, and T' is the discharge chute or trough.

The rising-and-falling or vertically-oscillating motion is imparted to the riffled plate R by means of an eccentric E', connected with said plate by a link e', rotary motion being imparted to the shaft s of said eccentric in any suitable manner, said shaft having its bearings in the vertical walls of vessel A, suitable stuffing-boxes being provided to prevent escape of water. This reciprocating motion of the riffled plate in opposite directions has for its result to maintain the black sand in continuous motion, thereby facilitating the scattering thereof in the body of confined water and the separation of the particles of metal from the sand, which are caught by the riffles, behind which they collect, and are removed from time to time.

I do not desire to limit myself to the precise means described and shown whereby a vertical reciprocation is imparted to the riffle, as other means whereby this result can t tained may be used.

Having thus described my invention, I claim as new therein, and desire to secu Letters Patent, is—

In a machine for working placer-gra vessel adapted to contain a body of wa plurality of superposed screens, and a r plate below the same arranged for imme in such body of water, rock bars or lev which the screens are pivotally connect both ends, and a pivotal connection bet the head of the riffled plate and the ba levers l; in combination with mechanis imparting a rocking motion to said ba levers l, and mechanism at or near the end of the riffled plate adapted to imp vertical oscillating motion to said plate pivots independently of the screens, fo purpose set forth.

In testimony that I claim the foregoi my invention I have signed my name in ence of two subscribing witnesses.

CHARLES F. PIK

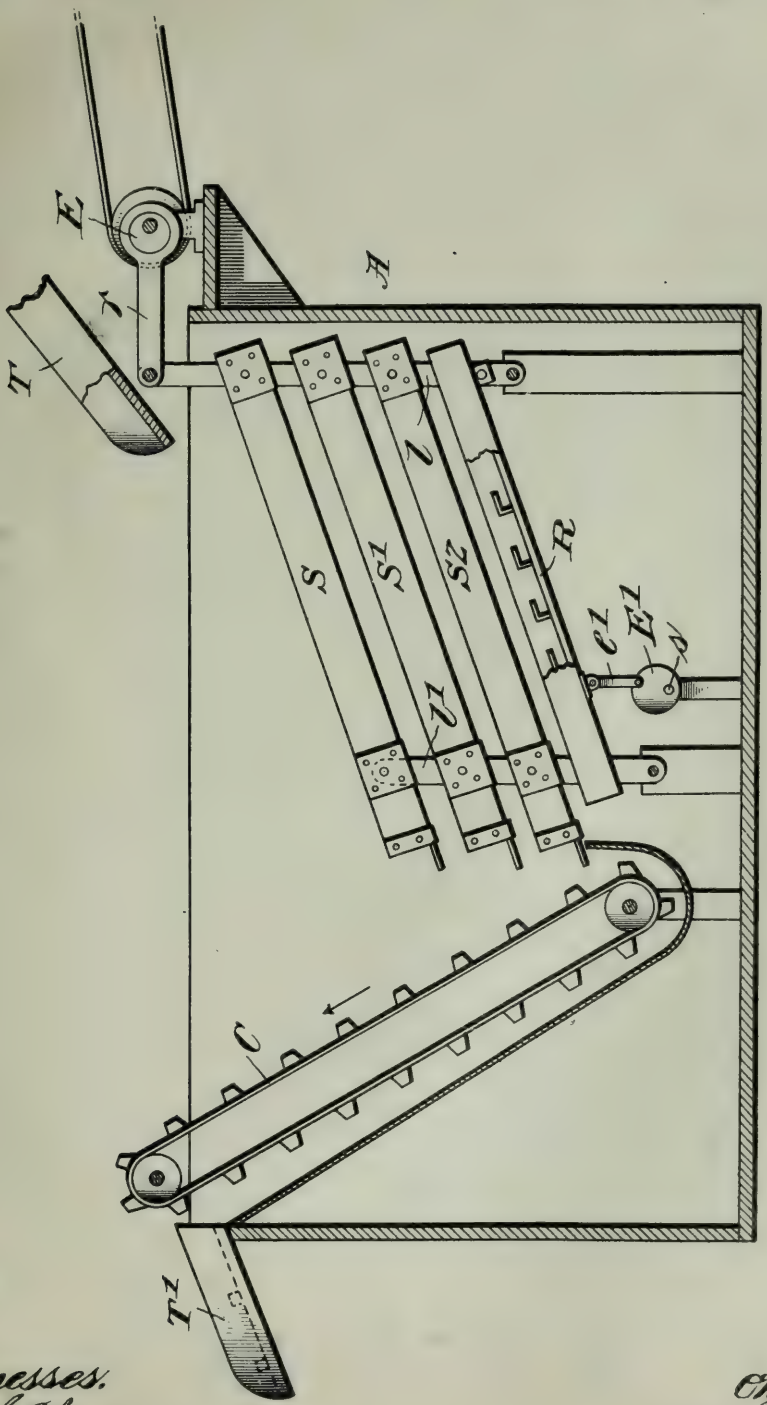
Witnesses:
A. P. FRITZ,
THOS. S. RODGERS.

(No Model.)

C. F. PIKE.

ORE WASHER AND SEPARATOR.

No. 566,534. Patented Aug. 25, 1896.



Witnesses.
B. S. Ober.
Henry Orth

Inventor.
Chas. F. Pike.
By Henry Orth
Atty

[Defendant's Exhibit "H"—Drawings and Specifications of Letters Patent No. 533,362, to J. Lampert, Patented January 29, 1895.]

[Endorsed]: District Court of the Fifth Judicial District of Arizona. The Mine and Smelter Supply Co. vs. Arizona Copper Co. In Equity #21A. Defendant's Exhibit "H." Lampert Patent #533,362. A. M. Parkins, Special Examiner. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "H." Received Aug. 20, 1913. F. D. Monckton, Clerk.

No. 349,504. Patented Sept. 21, 1886.

Fig. 1.

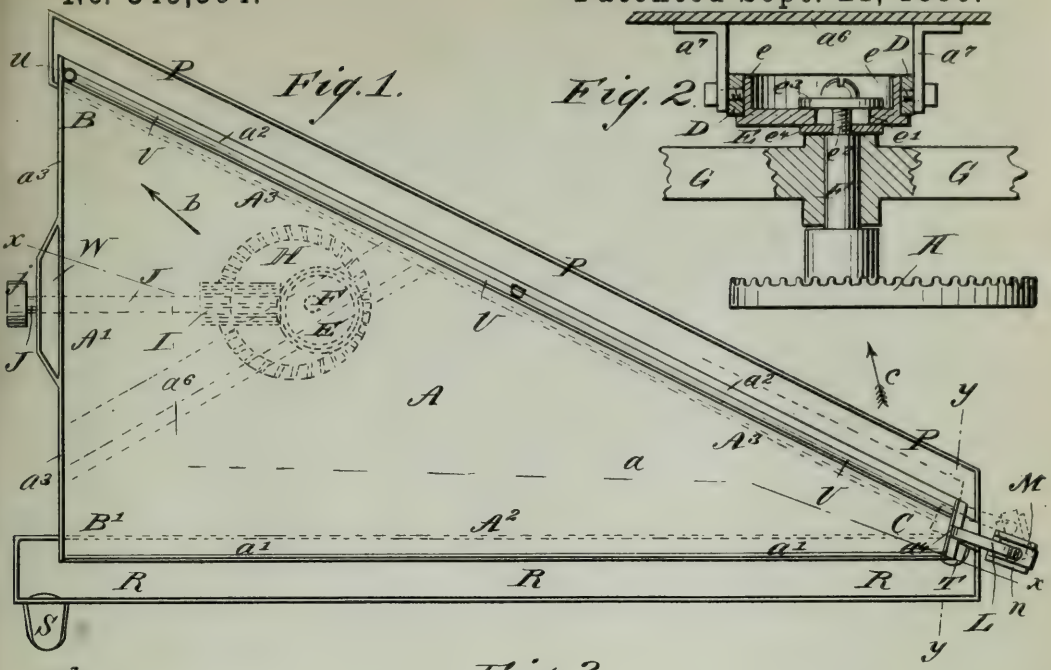


Fig. 2.

Fig. 3.

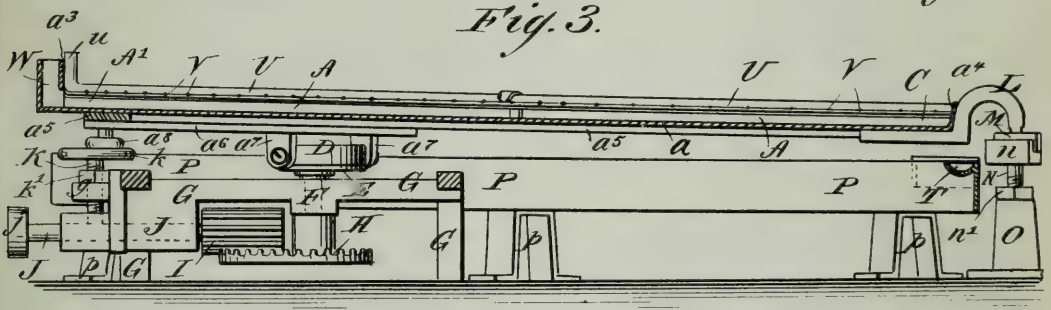
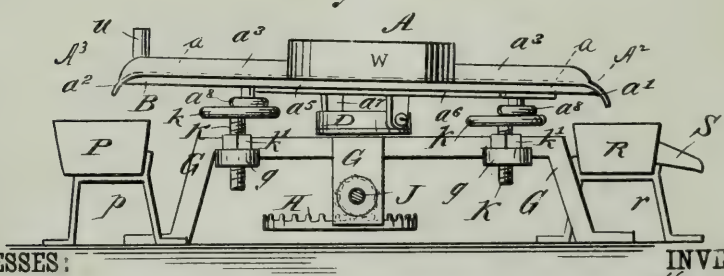


Fig. 4.



WITNESSES:

Geo. Twitchell.

C. Sedgwick

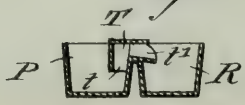
INVENTOR:

H. C. Krause

BY Munn & Co.

ATTORNEYS.

Fig. 5



HENRY C. KRAUSE, OF LAKE LINDEN, MICHIGAN.

ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 349,504, dated September 21, 1886.

Application filed April 27, 1886. Serial No. 200,289. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. KRAUSE, of Lake Linden, in the county of Houghton and State of Michigan, have invented a new and Improved Ore-Separator, of which the following is a full, clear, and exact description.

My invention relates to machines for separating and grading ores, and has for its object to provide a simple, comparatively inexpensive, and effective machine whereby ores of various kinds may be washed and concentrated, and the valuable mineral and the tailings separately and closely graded, and with economy of time and labor.

The invention consists in certain novel features of construction and combinations of parts of the machine, all as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of my improved ore-separator. Fig. 2 is an enlarged detail vertical sectional elevation showing the driving-gearing by which the pan is agitated bodily. Fig. 3 is a vertical sectional elevation taken on the irregular line $x\ x$, Fig. 1. Fig. 4 is an end view of the front end of the separator; and Fig. 5 is a detail vertical sectional elevation across the mineral and tailings boxes, and taken on the line $y\ y$, Fig. 1.

The separator-pan A is formed of a flat plate, a, having downturned aprons $a'\ a^2$, respectively, at the tail and head edges, and upturned flanges $a^3\ a^4$ at the front and back ends, respectively. The front end, A′, of the pan lies about at a right angle with the tail A^2 of the pan, and the head A^3 runs obliquely from the corner B of the pan toward the back end, C, of the pan, and preferably at an angle of from twenty-five to thirty degrees to the tail A^2. (See Fig. 1.)

To the bottom of the pan-plate a is fixed a marginal stiffening-frame, a^5, to which is fastened a bearer-plate, a^6, having lugs $a^7\ a^7$, to and between which is journaled a gimbal-ring, D, which fits loosely upon a flange, e, of a plate, E, which is held to the top of a shaft, F, journaled in a frame, G, fixed to the floor of the mill-house. The plate E is slotted at e' for the passage of a screw-bolt, e^2, which also passes through washers or clamp-disks e^3 e^4, above and below the plate, on its way to the shaft F. With this construction the flanged plate E may be adjusted eccentrically to the shaft more or less, to control the bodily horizontal throw of the pan, for purposes presently explained.

To the shaft F there is fixed a crown gear-wheel, H, the teeth of which are arranged eccentrically to the shaft, and this wheel H meshes into a long pinion, I, fast on a driving-shaft, J, journaled in the frame G, and having a pulley, j, to which a power-transmitting belt will pass from any convenient motor.

The flanged eccentric plate E and the eccentric crown gear-wheel H will be set to give an accelerated horizontal motion of the pan A toward its front head corner, B, in direction of the arrow b, and by adjusting the eccentric plate E any required extent of bodily throw may be given the pan in this direction, as the class of ores being separated may require.

The front end, A′, of the pan is provided, preferably, with fixed bearer-feet $a^8\ a^8$, which rest loosely on the tops of the large heads $k\ k$ of screws K K, which are threaded into lugs $g\ g$ of the frame G, and are provided with stop or jam nuts $k'\ k'$. By adjusting the screws K K the front end, A′, of the pan may be raised to give the desired inclination from said front end to the rear end, C, and also to give the desired inclination to the front end of the pan from its tail corner, B′, to its head corner, B. A preferred downward incline or pitch from B to B′ is about one-quarter of an inch to the foot; but the front end of the pan will be inclined this way more or less, as the ores being worked shall require. The gimbal-ring D will slip on the flange e of the eccentric plate E, to allow any necessary adjustment of the head of the pan, as above described, and also to accommodate vertical adjustment of the end C of the pan, as next explained.

To the pan A, at its end C, is fixed an arm, L, the outer part of which is bowed, and at the extremity of the arm there is swiveled a shoe or bearing-block, M, which is adapted to slide in the grooved head n of a screw, N, which is provided with a jam or lock nut, n',

and is threaded into a pedestal, O, on the mill-floor, as shown in Figs. 1 and 3 of the drawings. By loosening the nut *n'* the screw N may be raised or lowered in the pedestal O, and thereby vertically adjust the end C of the pan A, to give any necessary downward inclination to the pan from its front end toward its rear end. A preferred inclination of the pan in this way is about five-sixteenths of an inch to a foot; but the incline or slope may be varied by vertically adjusting the screw N and setting it by the lock-nut *n'*, as the class of ores being worked may require. This means for supporting the end C of the pan not only allows vertical adjustment of the pan at that end to give it proper slope, but also provides for giving this end of the pan a greater or less extent of lateral throw toward and over the mineral-box P, which is supported by suitable leg-frames, *p*, or otherwise, beneath the head A^3 of the pan, to receive the washed and graded mineral from the pan. It is obvious that when the back end, C, of the pan is set vertically the screw N may be locked by the nut *n'*, so as to hold the groove or slideway of the screw-head *n* at any desired angle to the stroke-line of the pan; hence when the head *n* is locked in the position shown in full lines in Fig. 1 the head of the pan at or toward its end C will receive very much less lateral movement in direction of the arrow *c* than it will receive when the head *n* of screw N is adjusted at a greater angle to the stroke-line of the pan, as shown in dotted lines. The lateral bodily movement of the back end of the pan in direction of arrow *c* is given as the pan is thrown or carried with accelerated movement in the direction of the arrow *b* by the eccentric gearing above described; hence this lateral motion of the back end of the pan will likewise be a comparatively quick one, and as the block M may be adjusted to a nicety to move at any angle to the general stroke-line of the pan, the finer ores passing toward the tail of the pan may be effectively separated and graded, as well as the coarser ores at and toward the head of the pan.

The tailings-box R is supported on suitable leg-frames, *r*, beneath the tail edge A^2 of the pan, and has a discharge-spout, S, and the back ends of the mineral-box P and the tailings or refuse box R will preferably be connected by a conduit, T, having an opening at *t* into the box P at about half the height of the box, and another opening at *t'* into the box R, whereby excess of water may pass off from the mineral-box to the tailings-box, and thence out at the spout S.

Water is supplied to the pan from a pipe, U, which ranges along and about parallel to the head A^3 of the pan, and just back of where the head-apron a^2 bends down from the main body of the pan. This pipe U will be connected to any source of water-supply at its end *u* by a flexible tube or pipe, allowing agitation of the pan, and the water will be delivered from pipe U into the pan in gradually-diminishing quantity or volume from the front end toward the back end of the pan, either by means of holes V of like size made in the pipe U at increasing distances apart toward the tail of the pan, or by holes V having gradually smaller sizes toward the back end, C, of the pan, and placed at like distances apart along the pipe, or by holes V made gradually smaller and also spaced farther apart toward the back end, C, of the pan, as may be preferred.

This graduated supply of water to the pan A allows the coarser and finer ore particles on the pan to be thoroughly washed with a minimum quantity of water, thereby not only avoiding waste of the water, but also preventing a washing and waste of the finer valuable ore particles back over the apron *a'* into the box R with the gangue or tailings.

The continuous operation of the machine is as follows: The crushed ore or gangue from the stamps will be fed onto the pan A through a box or chute, W, located at the front end of the pan, about over the driving-shaft J, it being understood that the plate E had been set to give the desired extent of bodily throw of the pan in direction of the arrow *b*, and that the pan had been set to incline properly from B to B', and from B B' to C, and that the slide-block bearing N *n* had been adjusted at proper angle to give the desired extent of lateral throw to the back end of the pan in direction of the arrow *c*. As the pulp or gangue flows toward the back end, C, of the pan, the quick or accelerated movement of the pan toward its highest point B, in direction of the arrow *b*, will carry or throw the heavier particles of ore toward that point, and the lighter ore particles will arrange themselves lower down the slope, according to their weight, and the current of water from the pipe U will wash all the worthless or comparatively worthless material over the apron *a'* of the pan into the tailings-box R, while the valuable mineral, by the forward impetus or momentum of the pan in direction of arrows *b* and *c*, will be carried over the head-apron a^2 of the pan into the mineral-box P in condition for smelting. The bearer screws K K and N may be adjusted vertically at any time to alter the inclinations of the pan while the machine is running, to regulate the washing, concentration, and separation of the ores more closely as the work progresses.

It is obvious that the valuable mineral will not only be concentrated, but will be separated or graded into different sizes in the box P, with the larger particles at and toward the front of the pan, and the successively smaller particles ranging toward the back end, C, of the pan. The tailings or refuse will also be graded into different sizes in the box R, thus allowing the larger particles to be removed together and stamped or reduced for subsequent treatment, to recover what of value there may be in them.

Having thus fully described my invention,

claim as new and desire to secure by Letters Patent—

1. In an ore-separator, the pan A, made with a front end, A′, and tail A^2, arranged about at right angles to each other, and with an oblique head, A^3, set at an angle of from twenty-five to thirty degrees to its tail, substantially as described, for the purposes set forth.

2. In an ore-separator, the pan A, made with a front end, A′, and tail A^2, arranged about at right angles to each other, and with an oblique head, A^3, set at an angle to the tail of from twenty-five to thirty degrees, an ore-feeding chute, W, at the front end of the pan, and head and tail aprons, a^2 a', and front and back flanges, a^3 a^4, substantially as described, for the purposes set forth.

3. In an ore-separator, the pan A, made with a front end, A,′ and tail A^2, arranged about at right angles to each other, and with an oblique head, A^3, set at an angle to the tail A^2 of from twenty-five to thirty degrees, in combination with mechanism for adjusting the pan-surface to give it backward slope from its front head corner, B, toward its front tail corner, B′, and toward its back end, C, substantially as described, for the purposes set forth.

4. In an ore-separator, the pan A, made with a front end, A′, and tail A^2, arranged about at right angles to each other, and with an oblique head, A^3, set at an angle to the tail A^2 of from twenty-five to thirty degrees, combined with mechanism for adjusting the pan vertically to give it a slope from its front head corner, B, toward its front tail corner, B′, and toward its back end, C, and mechanism for imparting an accelerated horizontal movement to the pan toward its front head corner, B, substantially as described, for the purposes set forth.

5. In an ore-separator, the pan A, made with a front end, A′, and tail A^2, arranged about at right angles to each other, and with an oblique head, A^3, set at an angle to the tail A^2 of from twenty-five to thirty degrees, in combination with mechanism for adjusting the pan to give it a downward inclination from front to back ends and from head to tail, mechanism for imparting an accelerated horizontal movement to the pan toward its high front head corner, B, and a water-distributing pipe arranged over and along the oblique head A^3 of the pan, and having orifices giving a downward discharge of water upon the pan toward its tail in gradually-diminishing volume from the front of the pan toward its back end, substantially as described, for the purposes set forth.

6. In an ore-separator, the pan A, made with a front end, A′, and tail A^2, arranged about at right angles to each other, and with an oblique head, A^3, set at an angle to the tail A^2 of from twenty-five to thirty degrees, in combination with mechanism for adjusting the head and tail of the pan to give it an inclination from the front head part, B, toward the front tail corner, B′, and toward the back end, C, mechanism for imparting a forward horizontal movement to the pan toward the front head corner, B, and a laterally-adjustable bearing at the back end, C, of the pan, with which said end is in sliding connection, substantially as described, for the purposes set forth.

7. The combination, in an ore-separator, of a pan having an oblique head, mechanism for giving the pan a downward slope from its front head corner, B, to its tail and back end, mechanism for imparting a horizontal forward movement to the pan toward its front head corner, B, and a laterally-adjustable bearing at the back end, C, of the pan, with which said end is in sliding connection, substantially as set forth.

8. The combination, in an ore-separator, of a horizontally-movable pan, an eccentrically-arranged flanged plate beneath and connected to the pan, a vertical driving-shaft, to which the eccentric plate is adjustably connected, and an eccentric driving gear-wheel on said shaft, substantially as described, for the purposes set forth.

9. The combination, in an ore-separator, of a horizontally-movable pan having an oblique head and a high front head corner, as at B, an adjustable eccentric flanged plate beneath and connected to the pan, and eccentric gearing imparting an accelerated horizontal bodily movement to the pan toward the front head corner, B, substantially as described, for the purposes set forth.

10. The combination, in an ore-separator, of a horizontally-movable pan, a gimbal-ring bearing, D, a vertical driving-shaft, an adjustable eccentric flanged plate working in said ring-bearing and connected to the driving-shaft, an eccentric gear-wheel, H, on said shaft, and a pinion, I, gearing with said wheel H, substantially as herein set forth.

11. The combination, in an ore-separator, of a horizontally-movable pan, an eccentrically-arranged flanged plate beneath the head of the pan, a shaft to which said flanged plate is connected, an eccentric gear-wheel on said shaft, and a swiveled sliding bearing supporting the back end of the pan, substantially as described, for the purposes set forth.

12. The combination, in an ore-separator, of a pan having an oblique head and a high front head corner, B, headed screws K K, arranged beneath the front end of the pan, an arm, L, connected to the back end of the pan, a slide-block, M, swiveled to said arm, and a screw, N, threaded into a support, O, and having a head, *n*, forming a guide for the block M, which thereby may be set at different angles to the stroke-line of the pan, and mechanism for imparting a horizontal movement to the pan toward its high front head corner, B, substantially as described, for the purposes set forth.

13. The combination, in an ore-separator, and with a horizontally-movable pan having

an oblique head and a front end and a tail arranged about at right angles to each other, and the surface of said pan sloping toward its tail and back end, of mechanism for imparting a forward movement to the pan toward its high front end corner, B, and mineral and tailings boxes P R, placed below the head and tail of the pan, respectively, substantially as described, for the purposes set forth.

14. The combination, in an ore-separator, and with the horizontally-movable pan A, constructed and operated substantially as specified, of mineral and tailings boxes P arranged below the head and tail of the p respectively, said boxes being connected conduit, T, next the tail of the pan, subst tially as herein set forth.

HENRY C. KRAUSE

Witnesses:
WILLIAM JOHN BENNETT,
CHARLES H. KRAUSE.

[Defendant's Exhibit "G"—Drawings and Specifications of Letters Patent No. 566,534, to C. F. Pike, Patented August 25, 1896.]

[Endorsed]: Mine & Smelter Supply Co. vs. Arizona Copper Co. Defendant's Exhibit "G." Patent to C. F. Pike, #566,534. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

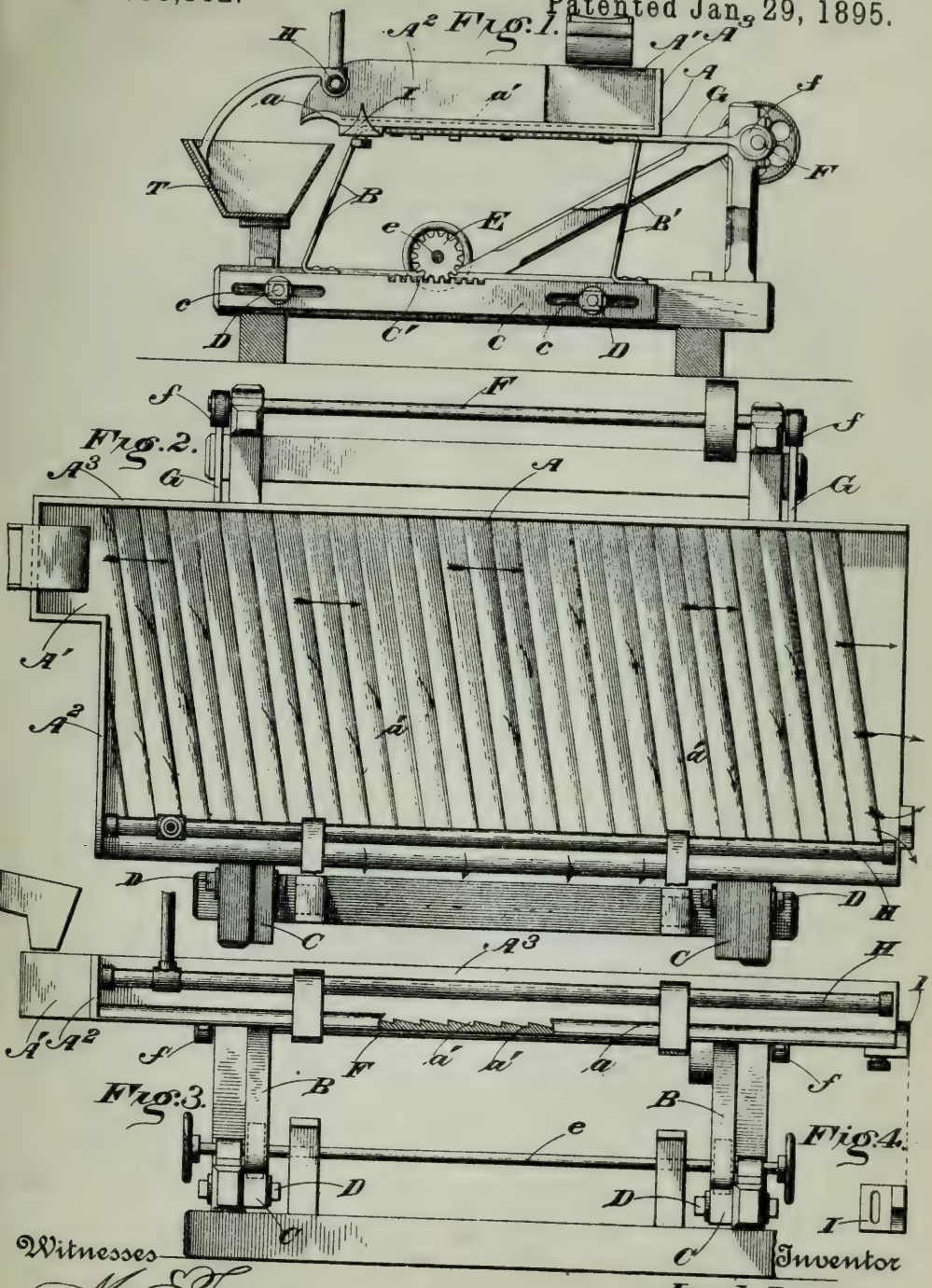
No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "G." Received Aug. 20, 1913. F. D. Monckton, Clerk.

(No Model.)

J. LAMPERT.

CONCENTRATOR.

No. 533,362. Patented Jan. 29, 1895.



Witnesses
M. C. Fowler.
James R. Mansfield.

Inventor
Jacob Lampert
by Alexander & Dowell
Attorneys

UNITED STATES PATENT OFFICE.

JACOB LAMPERT, OF HILL CITY, SOUTH DAKOTA.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 533,362, dated January 29, 1895.

Application filed March 16, 1894. Serial No. 503,917. (No model.)

To all whom it may concern:

Be it known that I, JACOB LAMPERT, of Hill City, in the county of Pennington and State of South Dakota, have invented certain new and useful Improvements in Concentrators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention is an improved concentrator, especially designed for operating upon fine and light concentrates. The construction will be clearly understood from the accompanying drawings and the following detailed description thereof; and the essential features of the invention are set forth in the claims.

In the drawings:—Figure 1 is an end view of the concentrator, the nearest end frame being partly broken away. Fig. 2 is a top plan view, partly broken away. Fig. 3 is a front elevation, partly broken. Fig. 4 is a detail.

The shaking table A is mounted upon supports B, B′, which are preferably bar springs, capable of sustaining the table but permitting it to be vibrated laterally. These supports are connected to the table and to the base frame of the machine, in any suitable manner, but in order to provide for adjusting the inclination of table I propose to adjustably connect the lower ends of said supports to the base frame. As shown supports B are longer than supports B′, and the lower ends of adjoining supports, at each end of the frame, are fastened to a horizontal longitudinal movable bar C, which is secured to the end piece of the main frame, by means of bolts D, passing through horizontal slots *c* in the bar, and thereby allowing the latter to be longitudinally shifted. The bars C can be shifted by means of pinions E on a shaft *e*, suitably journaled on the main frame, said pinions meshing with racks C′ on the bars, as indicated in the drawings. The shorter supports B′ are under the rear side of table, and the longer supports under the front or delivery side thereof. By moving bars C backward, the front side of the table will be elevated, faster than the rear side, and by moving the bars forward the front side of table will be lowered faster than the rear side, because of the unequal lengths of the supports, and thus by simply adjusting bars C the table can be adjusted as desired. Of course various other means can be used for adjusting bars C, or the supports, so as to enable the table to be adjusted as desired by the operator.

The receiving end of the table has a short hopper or box extension A′ into which the pulp is delivered, the pulp being kept from falling off the receiving end, or rear side of table, by flanges A^2, A^3, as shown. Along the delivery or front side of table is a bead or flange *a*, which rises slightly above the top of table, and over which the concentrates escape into a trough T, or other receiver.

The top surface of the table is transversely corrugated or grooved as indicated at *a*, the corrugations being slightly diagonal, inclining toward the delivery side and end of table, and extending from the rear side to the bead *a*, almost parallel with the line of vibration of table, and at right angles to the course of current of pulp. The corrugations—or small "riffles"—catch the fine and light concentrates, and direct them across the table to delivery side thereof.

The table is vibrated laterally by means of pitmen straps G engaging cranks or eccentrics *f* on a shaft F journaled in uprights of the main frame at the rear side of table.

H is a perforated water pipe suspended above the bead *a*, and connected with a water supply, so that a spray of water can be directed upon the bead at all times.

I is an adjustable "divider," attached to the delivery end of table, near the bead, and adapted to separate the sand and pulp which may work down close to the bead, from the concentrates which work down along the bead.

In operation the table is vibrated laterally, the water and pulp coming from plates or sizer is fed on the table at the upper end A′, and the concentrates being heaviest settle behind the corrugations or "riffles" *a′* and are moved toward the delivery side of the table, and are there thrown over the bead *a* by the rapid vibration of the table, which I propose running at about six hundred vibrations per minute. If the feed is rapid the

delivery side of board is slightly elevated so as to keep the sand and pulp near the rear side of table but the concentrates in the "riffles" are directed toward the bead and separated from the sand. Some of the lighter concentrates will follow down the inclined table near the bead to the tail end of table, and are directed by "divider" into the trough, while the sand is directed away from the trough. The course of the pulp and sand is shown by the full arrows on Fig. 2, and the course of the concentrates by tailless arrows thereon. The table has a double motion, laterally and vertically, which facilitates the separation of the concentrates.

The object of my water pipe H is to deliver a spray of water on the raised side or bead to keep the sand back and to keep the concentrates from packing; for if there was no spray of water on the bead the water from the pulp would stay back farther on the table and concentrates get dry and pack all along the raised bead.

The function of the "divider" is to separate the concentrates from the sand, as by starting up the shaking movement of the machine the concentrates find their way over to the bead and are thrown off but the finest of them and the heavy slimes are forced ahead of the sand, but they being too light to be thrown off at the side will run down along the bead to the lower end of table close to the edge of the bead the sand running down also. By adjusting the movable divider the light concentrates are directed into the box while the sand runs the other way into the waste.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent thereon, is—

1. The combination with the table having a series of diagonally arranged, corrugations or "riffles" and flanges on one end and side only, and a longitudinal "bead" extending along one end of the series of riffles with means for vibrating said table in a direction about lengthwise of the corrugations, and a water jet pipe suspended over the said "bead," substantially as and for the purpose specified.

2. The combination of the table A having a series of diagonally arranged corrugations a', and a longitudinal "bead," a, on one side, and the receiving trough T below the beaded edge of the table with the adjustable supports for said table means for vibrating it laterally, and a pipe for spraying water along the beaded edge of the table, substantially as and for the purpose set forth.

3. The combination of the table, having a series of transverse diagonally arranged "riffles" and also flanges at one end and side to prevent material dropping therefrom; the spring supports of unequal length for the table, the adjustable bars carrying said supports, and the mechanism for vibrating the table laterally, substantially as set forth.

4. The herein described concentrator, consisting of the table A having transverse diagonal corrugations a' upstanding flanges on its head end, and rear side, and a "bead" a on its front edge; the "divider" I attached to the tail end of the table; the spring supports B, B', for the table, the adjustable bar carrying said supports, mechanism for vibrating the table laterally, and the water jet pipe, all substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JACOB LAMPERT.

Witnesses:
FRANK A. STEVENS,
J. GEO. LAMPERT.

[Defendant's Exhibit "I"—Drawings and Specifications of Letters Patent No. 258,879, to A. Blatchly and G. Kustel, Patented June 6, 1882.]

[Endorsed]: District Court of the Fifth Judicial District of Arizona. The Mine and Smelter Supply Co. vs. Arizona Copper Co. In Equity #21A. Defendant's Exhibit "I." Blatchly and Kustel Patent, #258,879. A. M. Parkins, Special Examiner. Filed Nov. 18, 1912. Allan B. Jaynes, Clerk. By Frank E. McCrary, Dep.

No. 2291. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit "I." Received Aug. 20, 1913. F. D. Monckton, Clerk.

(No Model.) 2 Sheets—Sheet 1.

A. BLATCHLY & G. KUSTEL.

ORE CONCENTRATOR.

No. 258,879. Patented June 6, 1882.

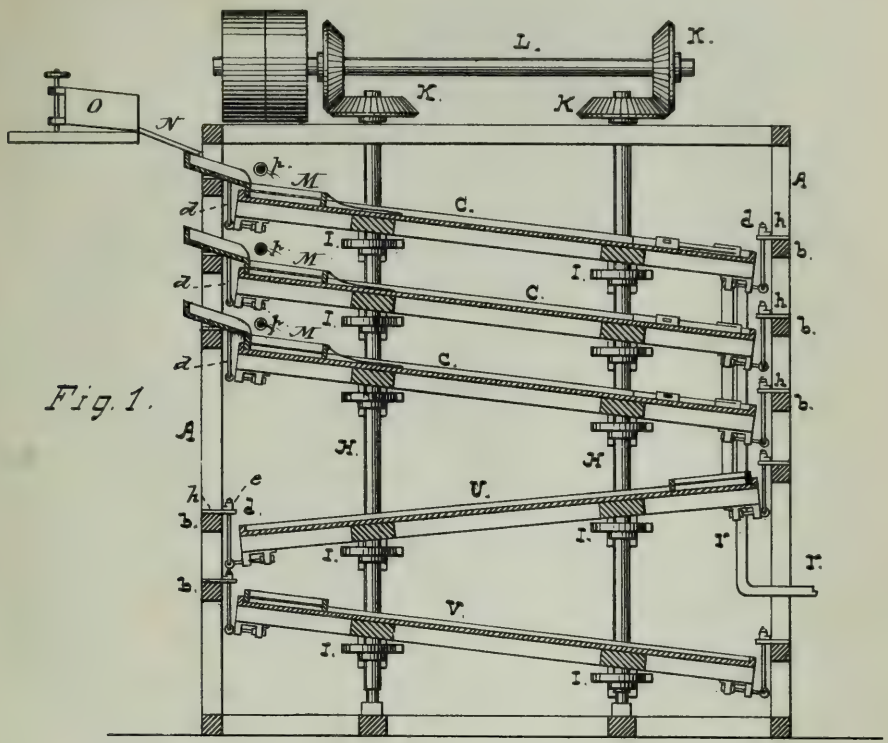


Fig. 1.

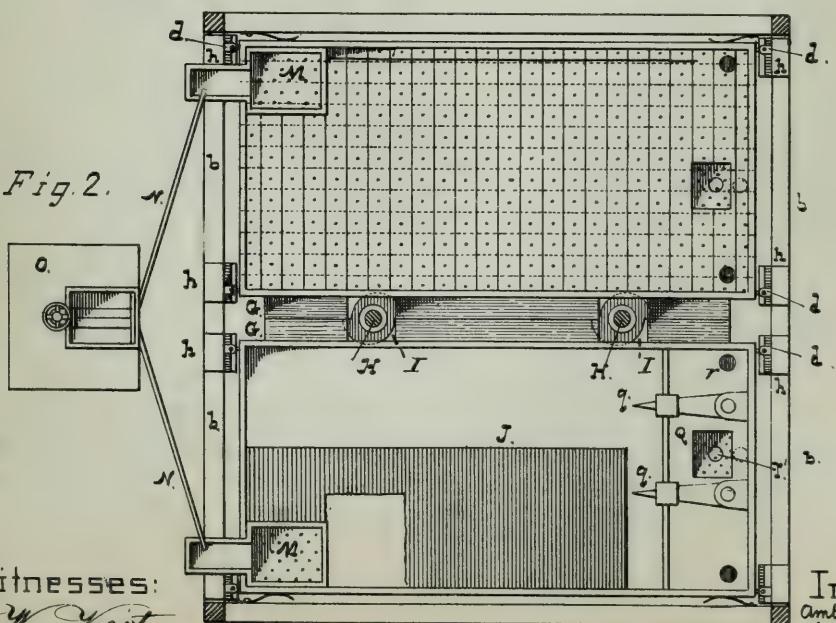


Fig. 2.

Witnesses:
W. Voit
W. F. Clare

Inventors:
Ambrose Blatchly
and Guido Kustel
by their Attys., Dana & Colton

(No Model.) 2 Sheets—Sheet 2.

A. BLATCHLY & G. KUSTEL.

ORE CONCENTRATOR.

No. 258,879. Patented June 6, 1882.

Fig. 3.

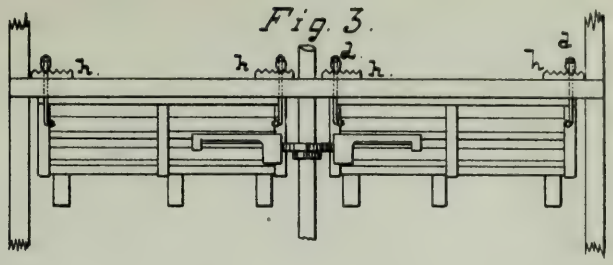


Fig. 4

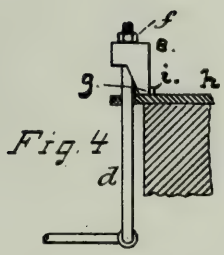


Fig. 5.

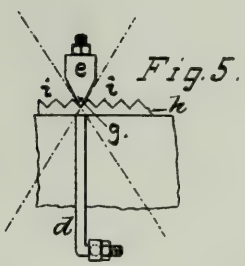


Fig. 6.

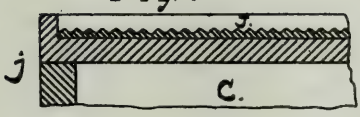
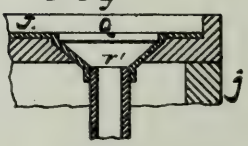


Fig. 7.



Witnesses:
W. Voit
Ed. F. Clark

Inventors:
Ambrose Blatchly
and Gustav Kustel
By their Attys., Dana & Dana

UNITED STATES PATENT OFFICE.

AMBROSE BLATCHLY AND GUIDO KUSTEL, OF SAN FRANCISCO, CAL.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 258,879, dated June 6, 1882.

Application filed April 2, 1881. (No model.)

To all whom it may concern:

Be it known that we, AMBROSE BLATCHLY and GUIDO KUSTEL, of the city and county of San Francisco, in the State of California, have invented an Improved Ore-Concentrator; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

Our invention relates to an improved machine for separating the heavy and valuable particles from the light and worthless portion of ore-pulp, sand, and auriferous earth, and at the same time concentrating the heavy particles in a body, so that they can be treated by any of the known gold-saving methods without handling the barren and worthless material.

The objects of the invention are to provide a machine of the above-mentioned character that will perfectly and effectually separate the particles passing over the surface of the tables, and providing the latter with means for separating the pulp or other auriferous material into three or more grades, and, further, separating and concentrating the middlings or second-grade particles. These objects we attain by the construction substantially as shown in the drawings and hereinafter described.

Referring to the accompanying drawings, Figure 1 shows an elevation and longitudinal section. Fig. 2 shows a plan view with the upper set of tables. Fig. 3 shows an end view with a pair of tables. Figs. 4 and 5 are detail views of the hanger from which the tables are suspended. Figs. 6 and 7 are longitudinal sections, showing details of the construction of the tables.

A represents any suitable frame-work, having cross-timbers *b b*, from which the inclined tables C C are suspended. The frame is wide enough to admit of two tables being suspended in it side by side, as represented at Fig. 3. Each table is suspended by rods or hangers *d* at each corner, so that the suspension of each table is independent of the other. We have represented three pairs of inclined tables suspended one above the other; but a single pair could be used. The construction of each table and the arrangement of the pairs are the same, so that we will only describe a single pair.

To provide a bed or table that will not warp or become distorted, we construct each one in the following manner: We make the bottom of each table of a number of narrow and separate strips of wood laid closely together, and arranged in two layers, one layer running longitudinally and the other transversely, so that the grain of one layer crosses that of the other. A wooden pin or metallic nail or screw is then inserted through the center of each cross-layer to secure and bind the strips firmly together. Cross-strips *j j* on the bottom and along the sides and ends serve to give the required stiffness, and a ledge or rim along the sides and ends of the bed completes the table. Upon this bed or floor we place a sheet or layer of india-rubber, J, a portion of the upper surface of which is provided with numerous parallel grooves running transversely across the bed. A quality of india-rubber which is well adapted for this purpose is that which is commonly used for covering the steps of stairs, and which is known as "stair-rubber." The corrugated portion of this rubber surface only extends from the outer rim of the table to the middle, or perhaps a little farther toward the opposite side or rim, leaving a plain smooth surface next to the inner rim.

A slotted plate, *h*, is secured upon the cross-beam *b* of the frame above each corner of the table C, and the hanger-rod *d* passes up through the slot. Each hanger-rod has a block, *e*, secured on its upper end by a nut, *f*. This block has a V-shaped projection, *g*, extending downward from its lower end. The plate *h* on one side of the slot has parallel grooves or notches *i* made on its upper side, in either of which notches the V-shaped projection *g* will enter and ride as the tables swing back and forth. By adjusting these rods or hangers in the notches the tables can be made to strike a harder or lighter blow when they come together, while the nut serves to give vertical adjustment. Bumper-bars G G are secured to the inner edges of the tables C C, opposite each other, so that the bumper-bars of the two tables meet half-way between them.

Two vertical shafts, H H, extend up between

the pairs of tables, one near each end, and on each shaft, directly between each two tables, is a double cam, I, which forces the two tables apart laterally as the shafts rotate, and then releases them, so that they drop back against each other with a concussion or jar. The shafts H H are driven in a reverse direction by bevel-gears K K from a driving-shaft, L, above the frame-work, so that their cams act upon the two tables of each pair simultaneously, and the friction or thrust of one is counteracted by that of the other.

In the upper outside corner of each table we secure a pan, M, the bottom of which is a screen, and the pulp is fed to the screen-pan of each pair of tables by divergent spouts N N, which lead from a hopper, O, into which the pulp is shoveled or otherwise deposited. The bottom of this hopper is made inclining from its middle in each direction, so that the pulp is equally divided and distributed to the two tables. The pan-screens are secured to the tables, so that they receive the same motion and jar that the tables receive, and this sifts the pulp through upon the upper outside corners of the concentrating-surfaces. A perforated water-pipe, *p*, passes across the upper ends of the tables, through the perforations of which jets of clear water are ejected upon the upper end of the tables. The pulp, when thus sifted upon the upper outside corner of the concentrating-surface, will begin to flow down toward its lower end; but the constant motion and concussion or jar will cause the heavier particles to separate and settle to the bottoms of the corrugations and be carried by the concussion directly across the table to the smooth surface, over which they will move in a diagonal direction to the lower corner of the table. The angle which the particles will take on moving across the smooth inclined surface will be greater or less according to their specific gravity, because the heavier the particles the more sensitive will they be to the concussion or jar, while the lighter particles, being less sensitive, will move down the incline in a more nearly direct line.

At the lower end of each table we secure two adjustable dividers, *q q*, the outer ends of which can be adjusted toward either side of the table, so as to divide the moving stratum of pulp into three grades. That which moves down into the space between the outer edge of the table and outer divider will be entirely worthless, while that which travels across the rubber surface to the inner side of the table and enters the space between the inner edge of the table and inner divider will be composed of the heaviest and most valuable particles. These latter particles are conducted through a pipe, *r*, directly to a receptacle where the concentrations are collected, while the worthless portions in the opposite corner are run to waste. This leaves only the middlings which are contained between the two dividers to be disposed of. These middlings consist of small particles of sulphurets and the large and heavy particles of worthless matter that do not become separated in passing over the surface. The very coarse particles contained in this grade will be worthless, because, if they were valuable, their weight would have carried them into the inner compartment. Hence we mount a screen, Q, over an opening, *r'*, in the table between the dividers, so that the fine particles will pass through the screen and down through the table, and fall upon the table below, while the large particles that pass over the screen enter an opening behind the screen and are carried to waste.

If we use two or more series of parallel inclined tables, the middlings of the upper tables will fall into the middlings-departments of the tables below successively, and, finally, the middlings of all the parallel series will fall upon the upper end of an oppositely-inclined pair of tables, U, below the upper series. On these tables the middlings are again subjected to the concentrating action of the lateral vibration and jar, and they fall from the lower ends of these tables upon another oppositely-inclined pair of tables, V, so that by the time they pass over both these lower tables the concentration will be complete.

The principal feature of our invention is the new mode of operation, consisting in sorting and grading the particles upon the concentrating-surface, and then conducting only the mixed grade to other tables for further separation, so that clean sulphurets are obtained from the first tables, and the remaining series of tables only separate and concentrate the unseparated and unconcentrated particles. This method insures a complete separation and concentration of the particles without any additional handling, the particles being automatically collected and directed to, upon, and over the successive tables.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an ore-concentrating machine, the two suspended tables C C, mounted in the same plane and provided with bumpers G G, in combination with one or more upright shafts, H, arranged between said tables and provided with cams I, substantially as and for the purpose specified.

2. In a swinging concentrating-table, C, the rod-hangers *d*, each of which is provided with an adjustable block, *e*, and a V-shaped projection, *g*, in combination with the slotted supporting-plate *h*, with its notched upper surface, substantially as and for the purpose described.

3. In a laterally-shaking concentrating-table, the india-rubber surface, one portion of which is corrugated, while the remainder is plain, substantially as described.

4. In an ore-concentrating machine, a series of inclined tables suspended in pairs, side by

side, in combination with mechanism for producing an outward motion, substantially as shown and described, said tables being provided with a partially-corrugated and a partially-plain surface, and having at their lower ends dividers *q q* and screen Q, substantially as and for the purpose specified.

In witness whereof we have hereunto set our hands and seals.

AMBROSE BLATCHLY. [L. S.]
GUIDO KUSTEL. [L. S.]

Witnesses:
B. J. BURNS,
H. KUSTEL.

[Certificate of Clerk U. S. District Court to Supplemental Record.]

United States of America,
District of Arizona,—ss.

I, Allan B. Jaynes, Clerk of the United States District Court for the District of Arizona, do hereby certify that the attached exhibits, being Defendant's Exhibits "A," "B," "C," "D," "E," "F," "G," "H," "I," constitute and are the original exhibits of the defendants in the cases of Mine and Smelter Supply Company, a corporation, Plaintiff, vs. Detroit Copper Mining Company, of Arizona, a corporation, Defendant, and Mine and Smelter Supply Company, a corporation, Plaintiff, vs. Arizona Copper Mining Company, a corporation, Defendant, No. 11 and No. 12, respectively in said Court, as the same appear from the original records of the same remaining in my office.

And I further certify that the above and foregoing constitute true and complete supplemental transcript of the record in said cause, being the defendant's exhibits omitted from the original transcript.

Witness my hand and the seal of said Court affixed at Phoenix in the District of Arizona this 16th day of August, 1913.

[Seal] ALLAN B. JAYNES,
Clerk.

[Endorsed]: No. 2291. United States Circuit Court of Appeals for the Ninth Circuit. Detroit Copper Mining Company of Arizona, a Corporation, Appellant, vs. The Mine and Smelter Supply Company, a Corporation, Appellee, and Arizona Copper Company, a Corporation, Appellant, vs. The Mine and Smelter Supply Company, a Corporation, Appellee. Supplemental Transcript of Record. [Defendant's Original Exhibits "A," "B," "C," "D," "E," "F," "G," "H" and "I."] Upon Appeal from the United States District Court for the District of Arizona.

Received August 20, 1913.

FRANK D. MONCKTON,
Clerk of the United States Circuit Court of Appeals for the Ninth Circuit.

By Meredith Sawyer,
Deputy Clerk.

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PAGE

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146 to 149 The District Court decisions; comments on them; not relevant or material here.

150 to 155 Review of the case.

UNITED STATES CIRCUIT COURT OF APPEALS

FOR THE

NINTH CIRCUIT

The Detroit Copper Mining Company of Arizona,
a Corporation,

and

The Arizona Copper Company, a Corporation,

Defendants-appellants,

vs.

The Mine and Smelter Supply Company,
a Corporation,

Complainant-appellee.

Appeal from the District Court of the
United States for the District
of Arizona

No. 2291.

BRIEF FOR THE APPELLANTS

This is an appeal from the District Court for the district of Arizona. The plaintiff below, the Mine and Smelter Supply Company, brought the suit in the first place against the defendants below—The Detroit Copper Mining Company of Arizona, and the Arizona Copper Company, in the Territorial Court of Arizona before its admission as state. Upon the erection of the territory into a state and the creation of a District

Court for it the cases were transferred to that court. The suit is for alleged infringement of U. S. patent 590, 675, to Arthur R. Wilfley, dated September 28, 1897, for improvement in ore concentrators. The defense is non-infringement.

The proceedings extended to great length, covering a wide field. The testimony on the part of the plaintiff consisted chiefly of depositions of experts. They related to the structure and operation of the machine, the construction and application of the claims of the patent, and the place and scope of the invention in the art. The whole controversy related to a single feature of the patented machine—to the deck, or top surface upon which the process of concentration goes on. In the presentation of its case in proof and argument the plaintiff assumed as a proper embodiment of the invention a form and configuration of deck, which, while not excluded by the terms of the patent, was not within its preferred form as described in the specification. Further remark upon this point will fit in more appropriately at a later period in the discussion. On this small foundation the case dragged its slow, interminable length along for three years, after the fashion of patent cases under the old equity pratice. It was submitted for final hearing November 18, 1912, and judgment entered for the plaintiff January 14, 1913.

The defendants were copper mining companies and used in their business a form of ore concentrator manufactured by the Deister Concentrator Company at Fort Wayne, Indiana. There was no dispute, there-

fore, about the use by the defendants of the machine which was alleged by the plaintiff to infringe its patent. While there were two separate parties defendant, the suits were by the same plaintiff for infringement of the same claims of the same patent by use of the same machines. Both defendants appealed on the same grounds. So by stipulation of counsel the appeals were docketed in this court as a single case; which it is hoped the court will approve.

Counsel are not able to state the errors relied on more concisely than in the terms of the assignment of errors stated in the prayer for appeal as follows:

ASSIGNMENT OF ERRORS

1. The court erred in holding that the Deister Concentrating Table No. 2, the machine which was the subject of the litigation, was an infringement of the patent in suit.

2. The court erred in holding that the low and diagonally deflected riffles on the said Deister Concentrator No. 2 were an essential feature of said Deister Concentrator.

3. The court erred in holding that the diagonal deflection of the ends of the riffles on the Deister Concentrator was the mechanical equivalent of the advancing terminal arrangement of the riffles on the Wilfley table.

4. The court erred in its construction of the claims of the Wilfley patent in suit.

5. The court erred in holding that it was a want of foresight in Wilfley to limit his claims as he did.

6. The court erred in holding that in view of the history and importance of the Wilfley patent in suit it should be construed, notwithstanding the language used by the inventor as covering the appropriation of this essential feature of the Wilfley table.

7. The court erred in denying the defendant's petition for rehearing.

8. The court erred in rendering judgment for the plaintiff.

The adequate argument of the questions presented in the record will cover a wide field and occupy much space and involve the citation of many authorities, which, however, can be presented intelligibly only after the elaboration of the propositions to which they relate. What we have now said is intended as the best compliance within our power with subdivisions (a), (b), and (c) of rule 24 to the point at which we may take up the argument, beginning with a description of the structures to be considered.

An ore concentrator is a machine for separating finely comminuted particles of metal from waste material mingled with it also finely comminuted. The comminution is commonly the result of grinding. The ore is found in streaks, veins and masses of varying size embedded in the solid rock. The rock is first broken up and the pieces that are rich enough in metal to go direct to the smelter are sent there. But after all that will do to go to the smelter in the lump has been disposed of a residue remains too poor in metal for that treatment, and that is ground in water into the form of "pulp" and sent to the concentrating

table. The percentage of the total output of the mine which has to be recovered in this way may be as much as thirty per cent. and more.

The field is an attractive one to inventors, and many patents have been isued for ore concentrators. There have been a few adjudications upon such patents in the district courts, but this is the first time within our knowledge that one of them has come before a United States Circuit Court of Appeals.

All concentrators of the type of the two here in controversy contain two elements in combination—a reciprocating movement, and a concentrating surface which is usually a combination of riffles and smooth space. The reciprocating movement is a minute form of oscillation not found in any other machine so far as we know. It is not necessary to describe the mechanism by which it is produced. There are numerous forms of it in use. It will be sufficient to describe the movement itself. It is a minute to and fro motion which, starting from a state of rest, begins slowly, accelerates to a maximum, then stops suddenly and returns relatively slowly. Its utility consists in the effect which it has to drive forward particles of mineral or grains of sand resting on the surface of the table. They move forward with the table in its slow initial motion without disturbance and are not disturbed by the gradual acceleration of that motion. But when the sudden stop comes they make a quick slip forward on the surface of the table. It is as though the table were jerked from under them, as it is, in fact.

These oscillations are very rapid—two or three

hundred in a minute. Solid particles on the table move along with an almost continuous motion. An important point to be noted is that if a grain of sand and a particle of metal start side by side on a table having this reciprocating movement the metallic particle will run away from the grain of sand. This is because the metallic particle, being of greater specific gravity, accumulates more momentum during the forward movement, and so travels further on the sudden stop. The beautiful way in which this reciprocating movement co-operates with the riffles on a concentrating table to push the material along between them will be explained a little later.

It will contribute to clearness to notice the extreme narrowness of the issue to be decided. In the bill of complaint infringement of the patent sued on is charged in restricted terms. In paragraph VIII of the bill, after reciting the purchase by the defendant of twelve concentrators from the Deister Concentrator Co., the pleading proceeds as follows:

> "And thereafter the same were delivered and installed in a mill owned and operated by said defendant at Morenci, Graham County, Territory of Arizona, and thereafter the same were used, and continuously ever since and still are being used in the concentration of ores by said defendant at the place aforesaid, with certain riffles upon the tops or concentrating surfaces thereof, which in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the improvements and invention so patented to said Arthur R. Wilfley as aforesaid by said hereinbefore described Letters Patent No.

> 590,675, now owned by your orator as aforesaid, and especially the improvements covered and protected by the first, second and seventh claims of said Letters Patent."

The answer of the defendant contains no denial of the validity of the patent sued on and no denial except this in paragraph V:

> "And denies that it has ever used or is using any ore concentrators, or ore concentrating tables with riffles upon the tops or concentrating surfaces thereof, which, in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the improvements and invention so patented to said Arthur R. Wilfley by said patent 590,675, or infringe the first, second and seventh claims of said patent, or any of them, or any of its claims."

Paragraph VI of the answer is in these words:

> "And said Defendant answering further, says that the art of making and using ore concentrators and ore concentrating tables was an old and well known art, and such concentrators and concentrating tables had been made and patented and used in many forms before the said Arthur R. Wilfley made the inventions or produced the apparatus described in said patent 590,675, and in support of this averment and to show the state of the prior art defendant will offer in evidence to be read at the final hearing the following United States patents; and if others shall come to its knowledge before the final hearing, it will ask leave to incorporate them into this answer by amendment or notice."

Followed by a list of twenty-one prior patents.

The sole issue made by the pleadings is, there-

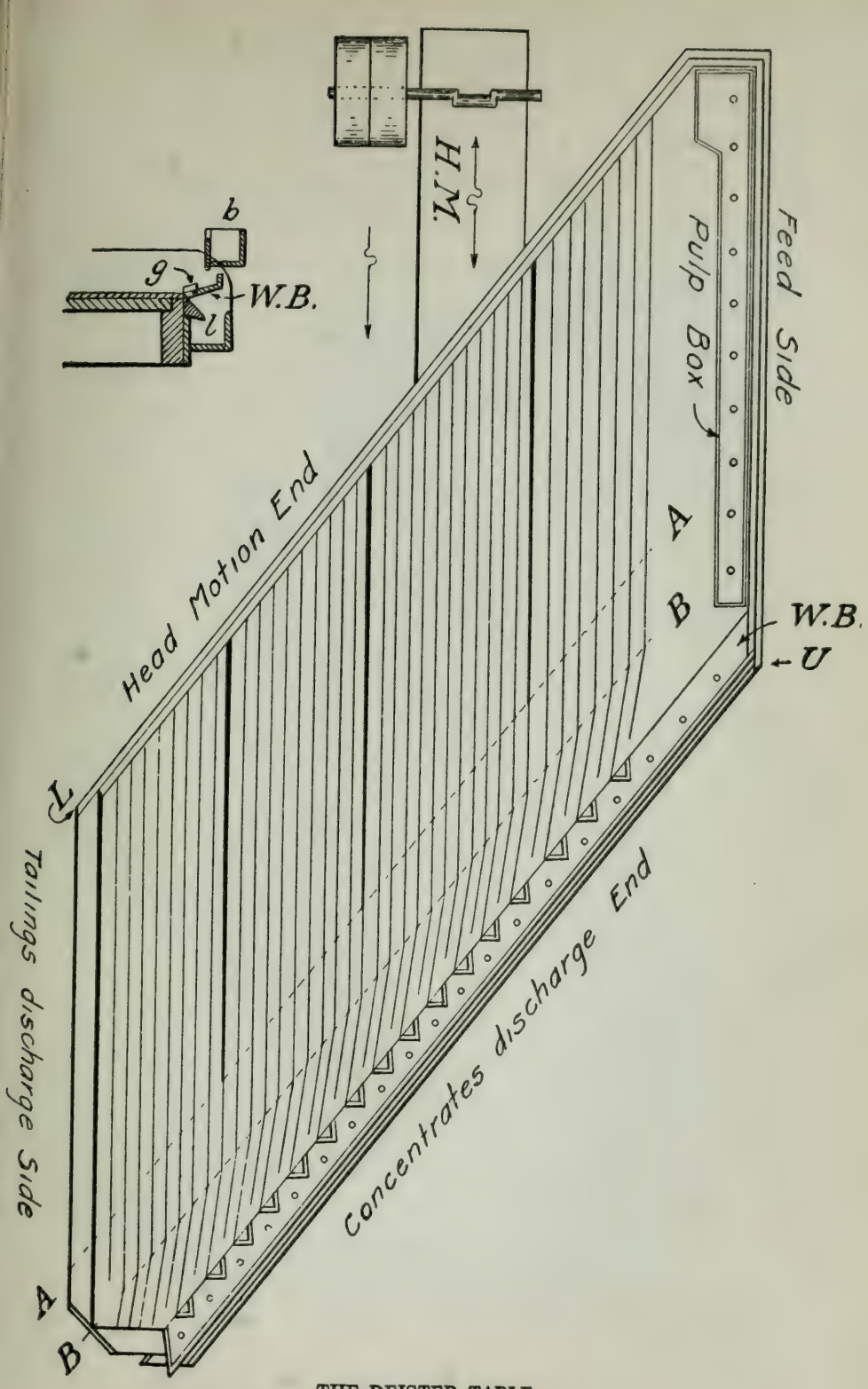
fore whether or no the riffles on the top, or concentrating surface of the Deister table in their "construction, adjustment and arrangement upon said table surface substantially embody and contain the improvements and invention so patented to said Arthur R. Wilfley." This limits the issue to the configuration upon the surfaces of the two tables. At the hearing in the District court we opened our argument by handing up to the court two printed reproductions of drawings, one showing Fig. 3, of the Wilfley patent and the other the deck of the Deister table. We will do the same thing now by inserting here the same two cuts. A look at these discloses the whole issue to be tried.

As the plaintiff's case rests on claims 1, 2 and 7 of the patent, and as those claims relate wholly to Fig. 3, and to the configuration of the deck of the table shown in Fig. 3, the case stands as though all the invention covered by the patent were the configuration of the deck of the table shown in Fig. 3, and the only claims in it were those numbered 1, 2 and 7. One would say, therefore, that it ought to present an easy case to try. Counsel for the appellant are optimistic enough to believe that the court will find it so.

Coming now to the argument of the questions to be decided, it seems to us that a convenient way to proceed will be to describe the construction and operation of the two tables in order—the Wilfley first and then the Deister.

THE WILFLEY TABLE

For this description reference will be made to the



THE DEISTER TABLE

(No Model.) 2 Sheets—Sheet 2

A. R. WILFLEY.

ORE CONCENTRATOR.

No. 590,675. Patented Sept. 28, 1897.

FIG. 3.

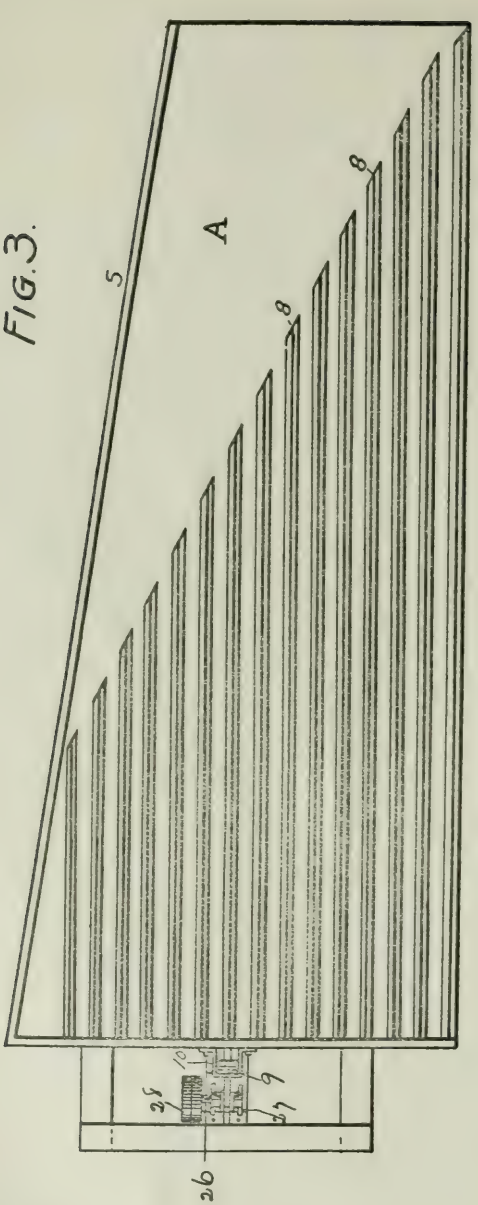
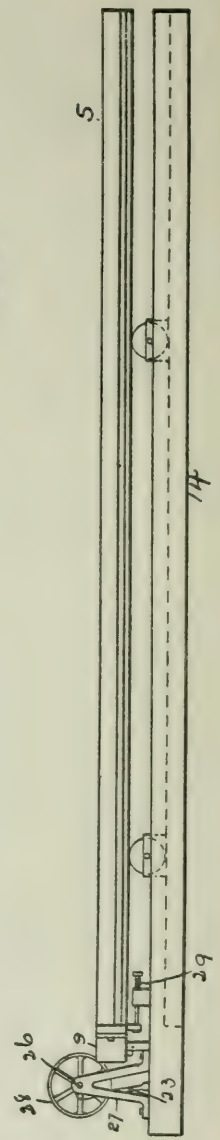


FIG. 4.



Witnesses
Edith Hinsworth

Inventor
A. R. Wilfley
By his Attorney
A. J. O'Brien

reproduction of Fig. 3, on the last page. In looking at the picture the page is to be so held that the broader end of the table shall be at the left. What is shown here, it will be remembered, is only the deck of the table with a portion of the mechanism which produces the reciprocating movement projecting from under. This mechanism is commonly called the "head motion" and that end of the table the head motion end. It is also distinguished in this case as the head of the table, and the narrow end at the right the foot.

The entire surface of the deck is first covered with linoleum. Upon a portion of it is then placed a group of riffles 8 8, leaving the remainder occupied by the triangular smooth space A. The riffles are of unequal length, the upper one being the shortest, and the others increasing progressively in length to the lowest, which extends the whole length of the table. The table is transversely inclined; that is, there is a uniform slope across the table from the upper and shortest riffle to the lower and longest one. A pulp box not shown in the drawing is located at the uppermost corner where a small vacant triangular space appears. This composition is about the consistency of chicken gravy and flows by gravity down across the rifles. Extending from the end of the pulp box to the foot of the table along its upper edge is a water supply from a perforated pipe or other device which floods the space A and the riffles below it at all times when the table is in operation.

The valuable constituent of the pulp is in form of fine particles of mineral mixed with a much greater

bulk of sand formed from the ground stone. The particles of metal are heavier than the sand. There is, therefore, a tendency to stratification in the mixture —the metal in the bottom and the sand above it. This tendency is greatly increased by the jarring effect of the reciprocating movements. The riffle troughs, or spaces between the riffles, act as reservoirs to hold the pulp momentarily as it passes. Thus the upper trough is filled first by flow from the pulp box and the pulp which fills it pauses an instant on its way. In that instant some of the metallic particles which are constantly tending to gravitate downward reach the bottom of the trough. That troughful of pulp, however, is immediately crowded out by the mass that follows it into the next trough, and then the next, and so on down, each troughful of pulp leaving a little mineral in the trough as it goes, until by the time it reaches the last one the mineral is all out of the pulp, leaving the gangue or worthless constituents to go over the lower side of the table as waste.

In the meantime, while this has been going on the material between the riffles has been moving toward their terminals under the impulses of the longitudinal reciprocating movement of the table. The riffles taper from the head motion end of the table at the left to their tips. Consequently the troughs between them grow shallower, exposing the material in them to the cross flow of water from the upper edge of the table with progressively increasing effect. The relatively greater specific gravity of the mineral particles tends to keep them at the bottom of the trough, and the sand

on top, where it is sheared off as the stratified mass moves along the troughs from their deeper to their shallower portions. Of course, this process is destributed from riffle to riffle as the pulp moves across them. Some particles of mineral are left in each trough and some go over with the pulp into the next trough where some more mineral is left, the pulp losing some mineral in each trough it crosses until, by the time it reaches the last one, nothing of value is left. It is apparent that if the taper of the riffles continues until they are very low—say 1-16th or 1-32nd of an inch in height, as it commonly does, the water flowing across them will shear off, first, the coarse sand, then the finer grains, until there will be little left in them except particles of mineral, and that little very fine sand. At this stage the mineral particles mixed with fine sand, emerge from the ends of the troughs at the riffles tips upon the smooth space A. There they encounter two forces acting in different directions. The reciprocating movement, if no other force were present, would impel both mineral and sand straight on in the lines of the rifle troughs produced to the foot of the table. The force of gravity and the flow of the water combined, if no other force were present, would sweep them down across the space A to the riffle terminals again. The controlling force is a resultant of these two, under the influence of which the particles tend to take diagonal paths across the space A. And here a certain assorting process goes on. The heaviest particles being most responsive to the reciprocating movement, follow lines

higher up on the space A and go off the table into the concentrates box at the foot at points nearer to the upper corner, while the lighter ones take lower paths, and leave at points lower down. In the perfect operation of the table the mineral should all leave it at the foot. There is a critical point, however, at the lower right-hand corner where some mineral that ought to go into the concentrates box will sometimes slip around the corner and get mixed with the gangue, or some gangue will slip around and get into the concentrates box. Provision is commonly made for this contingency by placing a receptable at the corner to catch this mixed product called middlings, which is then retreated.

This combination of rifles increasing in length progressively from the shortest at the upper edge of the table to the longest at the lower edge, with a smooth, plain, or unriffled space adjoining their terminals, constitutes the novel and characteristic feature of the table, and the process of washing the sand from the concentrates as the material emerges from the riffle troughs was the subject of much testimony and argument in the court below. The fairest way to describe that process will be to do it in the words of the patentee, and for that purpose we insert the following extract from the specification of the patent—page 2, lines 7 to 56: (Rec. p. 299)

> All the mineral, together with a portion of the gangue, is first caught by the riffles, and under the influence of the table's motion is carried longitudinally toward the foot of the table until it reaches the smooth, unriffled

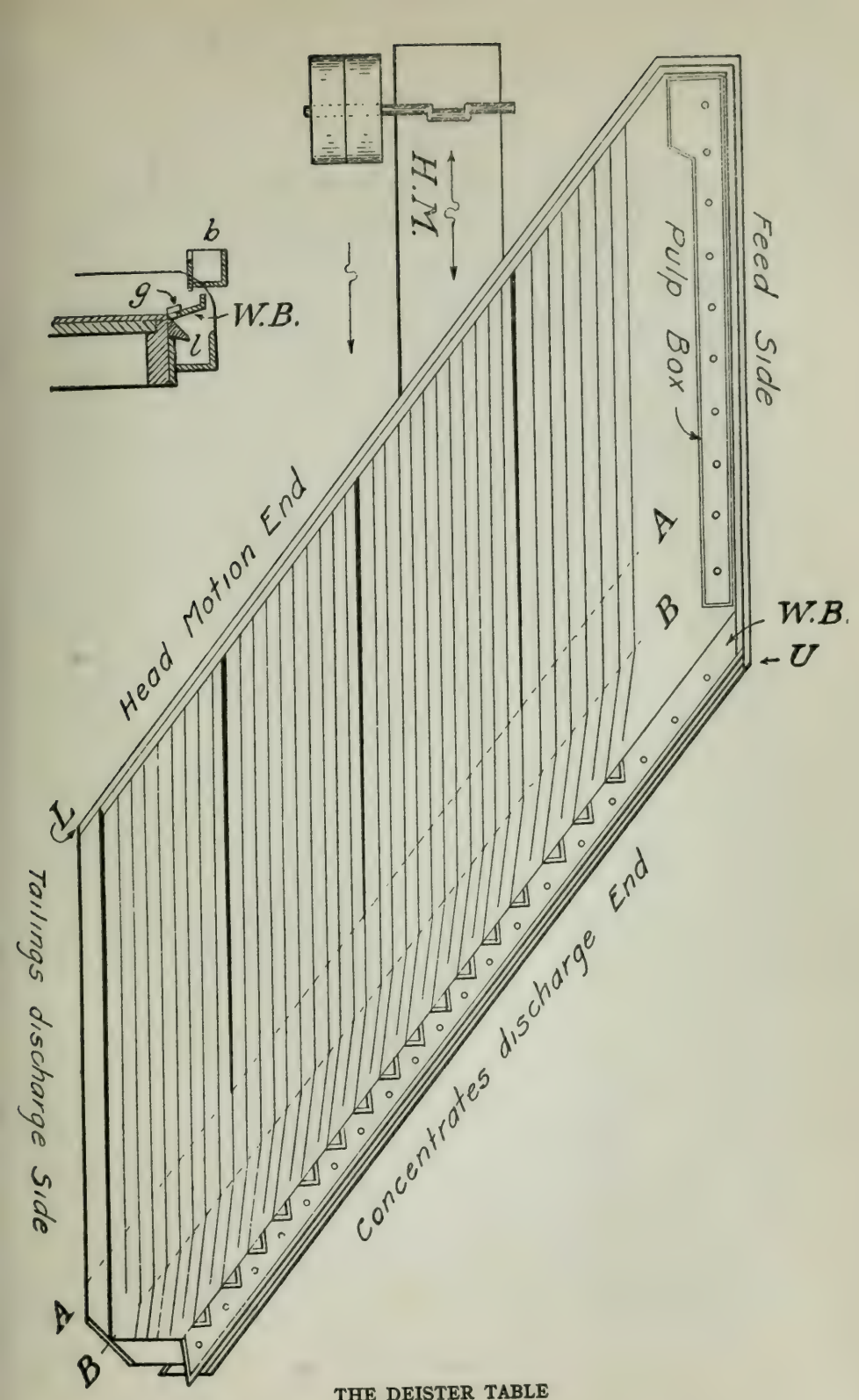
portion A of the table, where it is acted on by the water, which effects a perfect or approximately perfect separation of the gangue from the mineral. As the material caught by the uppermost and shortest riffle passes to the portion A of the table the action of the water, which is fed to the upper edge of the tables, carries the gangue downward to the next riffle, while the mineral remains on the smooth portion A and is carried toward the tail of the table, where it is finally discharged. It is expected that some of the mineral caught by the uppermost and shortest riffle will be carried downward with the gangue to the next riffle, which is longer. After leaving this last-named riffle and passing to the smooth or unriffled portion of the table the water again acts on the material and carries the gangue downward to the next riffle, leaving the clean mineral on the smooth portion A of the table. If any of the mineral escapes with the gangue the second time, it will be caught by the riffle next below and again subjected to the separating action of the water as soon as it reaches the smooth portion A of the table. In this manner the material is carried transversely downward and longitudinally forward, the gangue being discharged at the lower edge of the table completely impoverished of its mineral values, while the latter are discharged at the foot or tail of the table. A portion of the gangue—that is to say, the lighter part thereof—passes over each riffle in succession from the shortest or uppermost to the longest or lowermost riffle. The mineral and the heavier gangue are caught by the riffles and finally separated on the smooth portion A of the table. This combination, in a concentrating table, of riffles of varying length for catching the mineral and a smooth, plain, or unriffled portion at the extremities of the

riffles, where the final separation is effected through the action of the water, is believed to be entirely new in an apparatus of this class.

THE DEISTER TABLE

For convenience of reference we insert again in connection with this description the same cut of the Deister Table shown on an earlier page. This cut is a picture of the deck of the Deister concentrator which was in use by the defendant companies in their concentrating mills at Morenci when this suit was brought. It is, therefore, the very subject of the controversy here. Was the use of it an infringement of the Wilfley patent? The first step toward an answer to that question will be to describe the construction and operation of the table.

The table top, or deck, is a plane surface provided with riffles extending across its narrower dimension from the "head motion end" to the "concentrates discharge end." One would think he should say from the head motion side to the concentrates discharge side. But patent solicitors and mine men have a habit of calling the opposite edges of a concentrating table in which the riffles begin and terminate the ends of the table, whether that distance be the longer or shorter dimension of the table. The part marked H. M. is the actuating member of the mechanism by which the vibrating movement is imparted to the table, and goes by the name of the "head motion." The riffles are divided into four groups by riffles of greater height than the others, which are shown in the drawing in



THE DEISTER TABLE

heavy, black, tapering lines. These high riffles diminish in elevation from the head motion end to the line A A, along which line all the riffles are of the same elevation above the deck of the table. At that line they all drop off a little and equally in elevation. This may be 1–16th of an inch. From that line they all continue at the same elevation to the line B B, at which line they all drop off again in elevation to 1-32nd of an inch, at which height they continue to their terminals. In the space or zone lying between the line B B and the concentrates discharge line the riffles are slightly deflected toward the tailings discharge side of the table. At the feed side is shown the pulp box. This is raised slightly above the surface of the table, so that pulp flowing through the holes which are shown in it will spread over the unriffled space adjacent to the feed side. The pulp is fed from a spout discharging into the enlarged portion of the pulp box. With the assistance of the vibratory motion of the table the pulp tends to flow along the pulp box and out through the holes in it and spread over the unriffled surface below it. The table slopes generally from the feed side to the tailings discharge side, so that the pulp travels across the riffles leaving its valuable grains of metal between them as it goes until it falls off at the tailings discharge side as waste.

But this general declivity of surface is qualified by minor inequalities of elevation which play an important part in the operation of the table. When in operation the corner U is the highest point on the table, and the corner L the lowest. From its head motion

end to its concentrates discharge end the whole table has a slight slope upward. The vibratory movement causes the particles of metal to creep across the table along the riffle troughs. This movement is imparted by the projecting member marked H. M. The double-headed arrow is to indicate that the movement of that member is to and fro; the single-headed arrow is to indicate the direction of the resulting movement of the metallic particles along the riffle troughs. It would appear from this that the metallic particles are driven uphill as they creep along the riffle troughs, which is the fact, and an important fact, as we shall see.

We can now picture to ourselves the action of the table in operation. It is covered with pulp flowing across the riffles from the pulp box to the tailings discharge with a sort of tremulus movement caused by the vibrations of the table. As it goes the heavy particles of metal gravitate to the bottoms of the riffle troughs until, when it reaches the tailings discharge, they have all dropped out, and under the impelling force of the vibrating movement are creeping along the riffle troughs toward the concentrates discharge end. This is a continuous process going on hour after hour all day long.

But there other features of construction to be attended to which improve it still further. The high riffles have a utility not yet mentioned. They form dams across the table, above which pools are created which flood the riffles above them for some distance —something like half way to the next high riffle

above. In these pools the particles of metal have a little more time to settle than they would have if the high riffles were not there. As they pass out of them they are pushed along the riffle troughs by the vibratory movements toward the concentrates discharge. At the line of that discharge there is a supplementary device, known as the washboard, and designated by the letters W B in the drawing. This is a board set snugly against the edge of the table, with a sharp slope toward it, over which a film of water is kept flowing at all times when the table is in operation. The relations of the parts here are shown in detail in the little figure at the left. The letters W B again denote the washboard, which is seen fitted tightly against the edge of the table and sloping toward it. At *b* is a water box, which is kept filled so that water runs over by the notch in its upper edge and drops on the washboard to spread out over its surface in a thin film. At *g* is a little V-shaped guard fastened on the washboard, through the enclosed angle of which is a hole through the washboard, below which is a spout leading to the trough *l*. The concentrates leave the table through that hole, to be stored in the trough *l*. In the washboard W B of the main figure may be seen the same triangular guards shown at *g* in the small figure.

It will be seen that at the concentrates discharge end each alternate riffle is a little shorter than the one below it. The hole in the angle of the guard *g* on the washboard registers with the terminal of the longer riffle, so that the concentrates which come by the

trough alongside that riffle, drop through that aperture into the concentrates box. Just before leaving the table they are joined by the concentrates which came by the next trough above, so that each aperture receives the concentrates from two riffle troughs. When the concentrates from these two troughs reach this little space at the end of the short riffle they are met by the film of water flowing down the washboard, which washes out the last unseparated grains of sand which remain with them, leaving the clean metallic particles to go into the concentrates box.

The water which comes from the washboard serves also another useful function besides this final washing up of the concentrates. It has been stated that when the table is in operation the corner U is the highest point on it, and the corner L the lowest. From this fact, water flowing over the table will tend to cross the riffles nearly at right angles to them. This applies to all the water coming from the washboard. The water, in the first place, replenishes the pools formed above the high riffles, and in the diluted fluid thus produced the metallic particles settle more readily to the bottoms of the troughs, to be pushed on alon g them, as heretofore described. In the next place, that flow of water across the comparatively low riffles in the zones between the lines A A and B B, and B B and the concentrates discharge outlets operates to wash the sand remaining in them at the last minute down to the tailings discharge.

The Deister table came into the field long after the issue of the Wilfley patent, and is claimed to repre-

sent a large advance in the art. At the time this suit was begun it had not been patented. The court will want to understand its construction and operation as perfectly as possible. We will add to the general description just given a reference to three points which are specially deserving of notice. The first of these is the high riffles already mentioned. The function which they perform of creating pools above them which flood the riffles about half way to the next riffle above is a unique and valuable feature of the table. It is by a process of stratification that all concentrating tables work. If the mineral would not settle in the bottom of the riffle trough it might flow over a hundred of them and come off at the foot in the same condition in which it started. This stratification is greatly accelerated by dilution. If a man would put a pint of pulp and two quarts of water in a pan and shake it a few minutes with his hands, then pour off the top and put in more water, he would by and by have the mineral in the bottom of the pan. This is the method by which the forty-niners gathered gold from the sands and gravel in California. The modern ore concentrator is only an evolution from the forty-niner's pan.

The pulp flowing down the Deister table stops only for an instant in the pools above the high riffles. But for that instant the process of stratification goes on more rapidly than it would go if the pool were not there. In its passage from the head to the foot of the table it crosses about sixteen of these riffle trough pools. This dilution in connection with the jarring produced

by the reciprocating movement with its 250 vibrations per minute makes the mineral particles tumble down fast. There are no such pools as these on the Wilfley table.

In the next place it will be observed that on the Deister table the riffles in the division above the first high riffle are further apart than those in the divisions below it. They are also higher. When the pulp first emerges upon the table from the feed box it is rich in mineral. It begins to stratify at once, and concentration goes on rapidly. The fine particles of mineral cannot climb over the high riffles, but the coarser grains of sand can. The riffles in that group are specially adapted to the condition of the pulp at its first entrance on the table. We shall exhibit later proof of this fact in tests of the Deister table which show that substantially half of all the mineral recovered on the table comes from the first group of riffles. The pulp which goes over the first high riffle to be concentrated in the second group is comparatively poor stuff; that which reaches the third group poorer yet, and that which crosses the fourth group is poverty stricken.

Finally, a word further in relation to the low riffles in the zone between the line B B and the concentrates discharge. By the time the material reaches that zone the coarse sand has all gone over the riffles and down to the tailings discharge. But there remains a residue of every fine sand which it is difficult to separate from the mineral. It will go over riffles if they are low enough, but they must be very low. The

mineral particles mixed with it will also go over the riffles if they are low enough. The problem is to provide riffles low enough to let the fine sand go over, and at the same time high enough to keep the concentrates back. Mr. Deister found that as a rule one thirty-second of an inch would meet those conditions. But there is no magic in that exact figure. They might be a sixty-fourth of an inch higher and work well. And with pulp of relatively coarse quality a sixteenth of an inch will be best.

The deflection of the low riffles is for this purpose: In that zone the material is subject to two forces acting in different directions—one the force of the reciprocating movement, which tends to impel the material straight on to the concentrates discharge; the other the force of gravity and the flow of the water coming from the washboard which tends to carry the material down toward the foot of the table. The resultant of these forces is along a slightly deflected line across the zone between the line B B and the concentrates discharge.

And so by accommodating the riffles in that zone to that line it becomes a little easier to let the sand over and hold the concentrates back. This feature is the last refinement of construction in the most highly developed table in the art at the time it came out, every square inch of which does perfect work. But the deflected position of the low riffles is not a fundamental, nor even an important feature of the table. The riffles could keep straight on to the concentrates discharge without substantial change in the operation of the table.

After this description and comparison of the con-

struction and operation of the two tables as respects their decks it will be in order to take up for consideration the patent in suit.

THE WILFLEY PATENT

This patent was the foundation of the suits from which this appeal was taken. The sole question to be decided here, in a final sense, is whether or no the Deister table is an infringement of it. We wish to present a minute and careful discussion of it, which we cannot do unless it is first read by the court. There is a copy of it in the record at page 299, but it will be such an inconvenience to the court to follow in this brief the references which we wish to make to the patent, and compare them with the copy in the record, that we beg to leave to append hereto as an exhibit a zincograph cut of the patent which we have had made for the purpose to fit the brief.

Referring now to the patent, the first point to notice is that the solicitor who drafted it went to a world of trouble to make it plain. Its distinguishing feature is its combination of a group of riffles of progressively increasing length with an unriffled area adjoining their terminals. The repetition of adjectives used to describe this simple combination is something wonderful. For example, on page 2, line 21, it says "smooth portion A"; in line 28, it says "smooth or unriffled portion"; in lines 31, 36 and 48, it says "smooth portion A"; in lines 51-2 it says "a smooth, plain, or unriffled portion at the extremities of the riffles." Then when it comes to the claims he uses in

the first one the words "smooth, plain, or unriffled portion extending from the extremities of the riffles toward the tail of the table," and in each of the six other claims the words, "plain or unriffled portion". All this verbiage is to describe Fig. 3 of the patent. It means that one portion of the table is riffled and the other unriffled, or without riffles. Either of the three words, smooth, plain, or unriffled, would describe the unriffled portion A distinctly enough. Reading the language in connection with the drawing, as we are bound to do, it is as clear as words and drawings can make anything that the unriffled portion is a *single space adjoining the terminals of all the riffles.*

With this clean cut combination in mind we are ready to take up the subject of infringement. The first, second and seventh claims are the only ones of which infringement is alleged, and are in these words:

> "1. A transversely inclined concentrating table having a movement whose tendency is to carry the material longitudinally forward toward the tail or foot of the table, said table being provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length for the purpose specified, the table having a smooth, plain, or unriffled portion extending from the extremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue effected."
>
> "2. A transversely-inclined concentrating-table having a number of longitudinal riffles extending a portion of the table's length from

the head toward the foot, said riffles being of unequal length, the uppermost being the shortest while the other riffles increase in length from the upper edge to the lower edge of the table, the table having a plain or unriffled portion lying at the extremities of the riffles and adapted to receive the material caught by the riffles."

"7. The combination of a transversely-inclined concentrating-table having a series of riffles extending longitudinally from the head toward the tail of the table, said riffles being of unequal length, the uppermost being the shortest and the riffles increasing in length from the upper to the lower edge of the table, the table being provided with a plain or unriffled portion of suitable area located at the extremities of the riffles, means for feeding the material to the upper portion of the table's head, means for discharging water on the upper edge of the table, and suitable means for imparting to the table a longitudinally-reciprocating movement of a character adapted to move the material from the head toward the tail of the table."

It is to be borne in mind that a fundamental principle in the law of infringement is that unless all the elements of the claim are appropriated, there is no infringement.

3 Robinson on Patents, Sec. 922, page 96.
Tobey Furn. Co. v. Colby et al., 26 Fed., 100.
Newark Mach. Co. v. Hargett, 28 Fed., 567.
Byerly v. Cleveland L. O. Works, 31 Fed., 73.
Thoens v. Israel, 31 Fed., 556.
Prouty v. Ruggles, 16 Peters, 336.
Fuller v. Yentzer, 94 U. S., 288.
Water-Meter Co. v. Desper, 101 U. S., 332.
Rowell v. Lindsay, 113 U. S., 97.

The only qualification of the rule is where there

is substituted for an omitted element a known equivalent—an equivalent known to be such at the date of the patent.

Seymour v. Osborne, 11 Wallace, 516.
Rowell v. Lindsay, 113 U. S., 97.

The question to be decided therefore—the pivotal question in the case, is, *does the Deister table embody all the elements of these claims, or any of them?* If it embodies all the elements of any one or more of them, it infringes; if not, not. To that question we now invite the attention of the court.

The claims are so simple that we need not delay to make any formal analysis of them as is sometimes done. It will be most convenient to take the second claim first because it is the typical one of the three. It embodies two elements which we number (1) and (2) and put in italics so that they will appeal distinctly to the eye. It is in these words:

CLAIM 2.

> "A transversely-inclined concentrating-table having (1) *a number of longitudinal riffles extending a portion of the table's length from the head toward the foot, said riffles being of unequal length, the uppermost being the shortest while the other riffles increase in length from the upper edge to the lower edge of the table,* the table having (2) a *plain or unriffled portion lying at the extremities of the riffles and adapted to receive the material caught by the riffles.*"

It is scarcely necessary to say that a patent claim is to be read in connection with the things to which it

refers. If the language of the claim, taken in its plain, ordinary sense, fits the part or parts of the apparatus to which it relates, we know that that is the true sense of the words; if not, we must look into it further. Turning to Fig. 3, of the patent, which we insert again for ready reference, we find a construction corresponding exactly to the claim—the group of riffles of unequal length with the shortest at the top and increasing progressively to the lowest, and the plain, unriffled portion A lying at their extremities. The two elements of the claim correspond exactly to the two portions of the figure.

Does the Deister table contain these two elements? They comprise the whole Wilfley table. In some cases a claim will describe a device or part which may be transplanted from one environment to another so that the machine or apparatus into which it is transplanted can be said with truth to embody the elements of the claim. But here the elements of the claim constitute the whole table. To ask whether or no the Deister table contains the elements of Wilfley claim 2 is to ask whether the Deister table contains the Wilfley table, which is absurd. But counsel will say it may embody some principle or function which may be present in the operation of the Deister table. The Wilfley table, however, is a machine, and machine patents are granted for structures, not principles.

In Corning v. Burden, 15 Howard, 252, the court said, on page 268:

> "It is well settled that a man can not have a patent for the function or abstract effect of

(No Model.) 2 Sheets—Sheet 2.

A. R. WILFLEY.

ORE CONCENTRATOR.

No. 590,675. Patented Sept. 28, 1897.

FIG. 3.

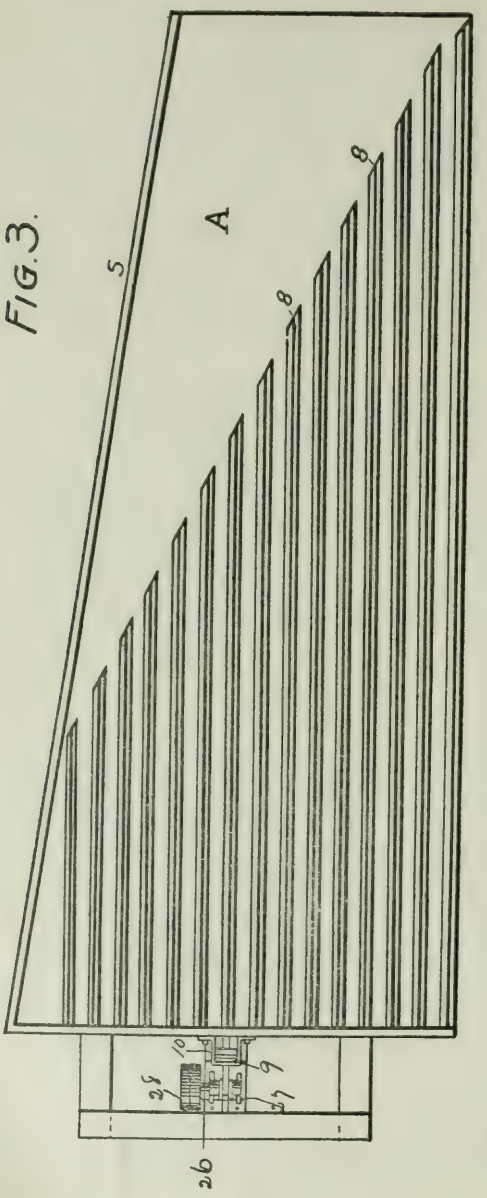
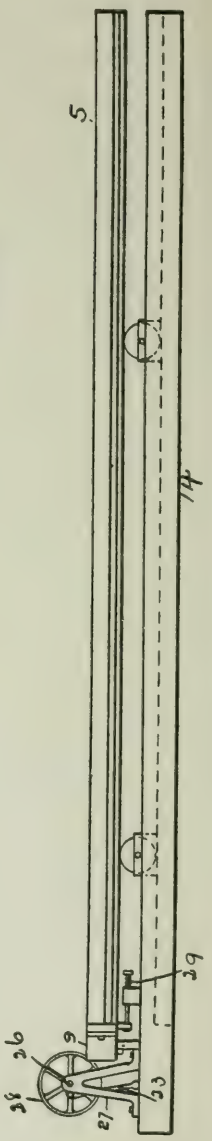


FIG. 4.



Witnesses
E. J. Delaunette
Edith Hinsworth

Inventor
A. R. Wilfley
By his Attorney
A. J. O'Brien

a machine, but only for the machine which produces it."

In Burr v. Duryee, 1 Wall., 531, 570, the court said:

> "We find here no authority to grant a patent for a 'principle' or a 'mode of operation' or an idea, or any other abstraction. A machine is a concrete thing, consisting of parts, or of certain devices and combinations of devices."

In Fuller v. Yentzer, 94 U. S., 288, the court said, citing Burr, v. Duryee:

> "Patents for a machine will not be sustained if the claim is for a result, the established rule being that the invention, if any, within the meaning of the Patent Act, consists in the means or apparatus by which the result is obtained, and not merely in the mode of operation, independent of the mechanical devices employed; nor will a patent be held valid for a principle or for an idea, or any other mere abstraction."

Other cases could be cited by the dozen.

It follows that the Deister table does not infringe claim two.

CLAIM 1.

Claim 1 is in these words:

> "A transversely-inclined concentrating-table having a movement whose tendency is to carry the material longitudinally forward toward the tail or foot of the table, said table being provided with (1) *a number of riffles extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length for the purpose specified,* the table having (2) *a smooth, plain or unriffled portion extending from the ex-*

tremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue effected."

It is not stated in this claim that the riffles increase in length progressively from the shortest to the longest, but that they "vary in length for the purpose specified." The purpose specified is the washing up action at the advancing terminals of all the riffles which we have described. No other purpose is specified in the patent. So that we have the same combination of a group of riffles of progressively increasing length in combination with a smooth portion at the extremities which is stated in claim 2, and which again corresponds exactly to the construction shown in Fig. 3. The Deister table does not infringe the first claim any more than the second.

CLAIM 7.

Claim 7 is in these words:

"The combination of a transversely-inclined concentrating-table having (1) *a series of riffles extending longitudinally from the head toward the tail of the table, said riffles being of unequal length, the upper-most being the shortest and the riffles increasing in length from the upper to the lower edge of the table,* the table being provided with (2) *a plain or unriffled portion of suitable area located at the extremities of the riffles,* means for feeding the material to the upper portion of the table's head, means for discharging water on the upper edge of the table, and suitable means for imparting to the table a longitudin-

> ally-reciprocating movement of a character adapted to move the material from the head toward the tail of the table."

Here we have a group of riffles of unequal length, the uppermost the shortest and increasing in length from the upper to the lower edge of the table, in combination with a smooth portion. Turning again to Fig. 3, we find the riffles and the smooth portion A exactly as called for in the claim. This claim also specifies "means for discharging water on the upper edge of the table." The first and seventh also specify a longitudinally recriprocating movement tending to move the material forward from the head toward the tail or foot of the table.

But inasmuch as the Deister table does not infringe if it omits any element of the combination we need not concern ourselves with the reciprocating movement, or the water supply, or the transverse inclination, or anything else except the two elements present in all three of the claims and conspicuously absent from the Deister—the group of riffles of progressively increasing length and the smooth space adjoining their terminals. The absence of these elements from the Deister table is so manifest to observation that a glance at the drawing is enough to show it.

It is a rule of construction applicable to every writing executed by men, from an international treaty to a lease of a potato patch, that words are to be taken in their natural and ordinary sense unless some reason appears for taking them in some other sense. No such reason appears here. The patent and its claims

are in the English language. The subject-matter—the deck of a concentrator, is simplicity itself. The court needs no help from experts to understand the meaning of the words or how to apply them.

If we have applied these claims to the subject matter correctly and according to law, we seem to be at the end of this case. And why have we not? There is no room for dispute about the structure of the two tables. There is no ambiguity in the words of the claims. An expert could mouth them over for a week without making them any plainer. So there we are.

We are aware, however, that counsel on the other side will try hard to maintain a different view of the claims, so we will try to forestall him, if we can, by reference to some cases on the subject. For this we will begin with those which we cited in the District Court, which are as pat as any we know of. But as we failed there we shall feel like adding a few more for good measure. It will be easy to skip the pages if they grow tiresome to the court.

McClain v. *Ortmayer,* 141 U. S., 419.

The suit was for infringement of two patents to McClain for improvements in horse collars. The decision of the case hinged upon the construction to be given to the claim of one of the patents. On this point the court said on pages 423-4 of the report:

> "While the patentee may have been unfortunate in the language he has chosen to express his actual invention, and may have been entitled to a broader claim, we are not at liberty, without running counter to the entire

> current of authority in this court, to construe such claims to include more than their language fairly imports. Nothing is better settled in the law of patents than that the patentee may claim the whole or only a part of his invention, and that if he only describe and claim a part, he is presumed to have abandoned the residue to the public. The object of the patent law in requiring the patentee to 'particularly point out and distinctly claim the part, improvement or combination which he claims as his invention or discovery,' is not only to secure to him all to which he is entitled but to apprise the public of what is still open to them. The claim is the measure of his right to relief, and while the specification may be referred to to limit the claim, it can never be made available to expand it."

In *Seabury* v. *Johnson,* 76 Fed., 456, the foregoing case was cited and applied. The suit was for infringement of a patent for a disinfectant in the form of a sulphur candle. The first claim, of which infringement was alleged, was in these words:

> "(1) A sulphur candle, provided with a surrounding band of metal, projecting slightly above the upper side or end of the main portion or body of said candle, substantially as described."

The defendant made a sulphur candle fixed in a paper box. It was held that it did not infringe. The following is from opinion on page 459:

> "But the inventor, for reasons doubtless satisfactory to himself, deliberately limited his claim to a 'metallic band,' although it is quite clear from the words of the specification that he was perfectly well aware that bands of

> other material might suffice. Believing that metal bands were 'preferable' he deliberately chose them for his monopoly, and chose them only. His act in so doing was nothing more nor less than a declaration that he abandoned to the public the right to use bands which were non-metallic. The law of patents requires that the patentee shall particularly specify and point out the part, the improvement, or combination which he claims as his invention or discovery. Courts are bound by the language chosen by the inventor; and they have neither the right nor the power to enlarge a patent beyond the scope of its claim, as allowed by the Commissioner of Patents."

Hubbell v. *United States,* 179 U. S., 77, 83-4.

Hubbell had a patent for improvement in metallic cartridges, which he claimed was being used by the government. He filed a petition in the Court of Claims for compensation, which was disallowed. From that disallowance he appealed to the Supreme Court, where it was affirmed. It was held that the cartridges used by the government were not within the terms of the claims of Hubbell's patent. In the proceedings in the Patent Office he had narrowed his claim to meet the objections of the Examiners. Upon the subject of the effect of such amendment and the construction of the claim the court said, on pages 83 and 84:

> "Whether the Examiners were right or wrong in so holding we are not to inquire, as the claimant did not appeal, but amended his claim and accepted a grant thereof; thereby putting himself within the range of the authorities which hold that if the claim to a combination be restricted to specified elements, all

must be regarded as material, and that limitations imposed by the inventor, especially such as were introduced into an application after it had been persistently rejected, must be strictly construed against the inventor and in favor of the public and looked upon as in the nature of disclaimers

" 'It may be observed that the courts of this country cannot always indulge in the same latitude which is exercised by English judges in determining what parts of a machine are or are not material. Our law requires the patentee to specify particularly what he claims to be new, and if he claims a combination of certain elements or parts, he cannot declare that any one of these elements is immaterial. The patentee makes them all material by the restricted form of his claim.' "

Stirrat v. *Excelsior Mfg. Co.,* 61 Fed., 980, C. C. A.

The patent in suit was for a water heating device for stoves and ranges. Without delaying to repeat the description of the device and discussion of the art found in the opinion, we quote from it the following statement, on page 984, of the rule applied to the construction of claims:

"The claim of a specific combination or device in a patent is a renunciation of every claim to any other combinations or devices for performing the same functions that are apparent from the face of the patent, and are not colorable evasions of the combination or device claimed. The statute requires the inventor to 'particularly point out and distinctly claim the part, improvement, or combination which he claims as his discovery.' Rev. St., Sec 4888. When, under this statute, the inventor has done this, he has thereby disclaimed and

> dedicated to the public all other improvements and combinations apparent from his specifications and claims that are not evasions of the device or combination he claims as his own. The claims of his patent limit his exclusive privileges, and his specifications may be referred to to explain and to restrict, but never to expand them."

Railroad Company v. *Mellon,* 104 U. S., 112.

The suit was on a patent for an improvement in the mode of attaching tires to the wheels of locomotives. The construction employed by the railroad company was not covered by the words of the claim; but it was argued on behalf of the patentee that it was adequately described in the specification, to which he sought to refer for explanation of the language of the claim. But this the court held to be inadmissible, and after quotation of the patent statute expressed its opinion as follows, on page 118 of the report:

> "As a rule, therefore, the specification filed with the application for letters patent contains a general description of the invention sought to be patented, which is followed by what is technically called the 'claim'. In reference to this latter part of the specification this court, speaking by Mr. Justice Bradley, has said: 'It is well known that the terms of the claim in letters patent are carefully scrutinized in the Patent Office. Over this part of the specification the chief contest generally arises. It defines what the office, after a full examination of previous inventions and the state of the art, determines the applicant is entitled to.' *Burns* v. *Meyer,* 100, U. S., 671. See also *Keystone Bridge Co.* v. *Phoenix Iron Co.,* 95 id., 274, 278.

> In view, therefore, of the statue, the practice of the Patent Office, and the decisions of this court, we think that the scope of letters patent should be limited to the invention covered by the claim, and that though the claim may be illustrated, it cannot be enlarged by the language used in other parts of the specification.
>
> We are, therefore, justified in looking at the 'claim' with which the specification of the appellee's invention concludes, to determine what is covered by his letters patent."

Burns v. *Meyer,* 100 U. S. 671.

The patent was for a side-saddle tree. The claim was for a "side-saddle tree having the side bars and seat made separate and then united."

The court said on page 672 of the report:

> "It is well known that the terms of the claim in letters patent are carefully scrutinized in the Patent Office. Over this part of the specification the chief contest generally arises. It defines what the office, after a full examination of previous inventions and the state of the art, determines the applicant is entitled to. The courts, therefore, should be careful not to enlarge, by construction, the claim which the Patent Office has admitted, and which the patentee has acquiesced in, beyond the fair interpretation of its terms."

Keystone Bridge Co. v. *Phoenix Iron Co.,* 95 U. S., 274.

The patent was for improvements in iron truss bridges, The improvement consisted in the use of wide, thin rolled iron bars with enlarged ends. The claim in controversy was in these words:

"3d, the use for the lower chords of truss frames of *wide* and *thin* rolled bars with enlarged ends, formed by upsetting the iron, when heated, by compression into moulds of the required shape, for the purpose of increasing the density, toughness and strength of the eye of the rod, and enlarging the eye, without diminishing its transverse section, substantially as hereinbefore described."

The defendant company used round or cylindrical bars. The following is from the opinion of the court by Justice Bradley on pages 278 and 279 of the report:

"When a claim is so explicit, the courts cannot alter or enlarge it. If the patentees have not claimed the whole of their invention, and the omission has been the result of inadvertence, they should have sought to correct the error by a surrender of their patent and an application for a reissue." * * * * As patents are procured *ex parte,* the public is not bound by them, but the patentees are. And the latter cannot show that their invention is broader than the terms of their claim; or, if broader, they must be held to have surrendered the surplus to the public."

Roemer v. *Peddie,* 132 U. S., 313.

Under this title there is a whole bunch of cases which were all heard and decided together—two from New York and two from New Jersey, and all in favor of William Roemer on a patent for a combined lock and handle for traveling bags. When the patentee was applying for his patent he tried to get a claim covering the combination of the lock-case with the handle-rings. He was rejected on a prior patent and amended his claim to confine it to a lock-case with notched sides near its ends to receive and hold the handle-rings. In

the suits on it before the court (four of them) he sought to give like effect to his amended claim to that which he could have given to the original. This the court held that he could not do. The following is from page 316 of the report:

> "The Patent Office would not grant a patent for it generally in combination with the handle-rings, but only specifically when used for the sides of the lock-case and for the handle-rings. The orator accepted the patent narrowed in that manner, and cannot now be heard to claim that it is any more broad than that in its scope. He invented this particular form of lock-case, and his patent is for that only, and it cannot be construed to cover anything else."

On the following page twelve Supreme Court decisions are cited in support of the proposition; to which may be added in the next volume *Phoenix Caster Co.* v. *Spiegel,,* 133 U. S., 360.

In *Brown* v. *Stilwell,* 57 Fed., 731 (C. C. A., 6th Cir.), in which the opinion was delivered by Judge Taft, this language was used on pages 739-40 of the report:

> "As the patentee has expressly limited himself to the connection with the boiler, he has given to the defendant below, and to the world, so far as he is concerned, the right to make the connection at any point outside the boiler and steam dome, without infringing his patent. This rule in the construction of patents is so well established as hardly to need authority."

In *Cincinnati Ry. Supply Co.* v. *American Hoist & Derrick Co.,* 143 Fed., 322 (C. C. A., 6th Cir.), the

opinion contains the following statement:

> "The law requires the patentee to define in his claim precisely what his invention is. This Crosby has done, and the court has no power to disregard the plain terms of the claim and either change or enlarge it by a reference to the specification."

In *Groth* v. *International Postal Supply Co.*, 61 Fed., 284 (C. C. A., 2nd Cir.), the patent in suit was recognized as embodying a primary invention, but the court said on page 287 in the opinion by Judge Shipman:

> "This just principle is one that is well recognized; but another principle is, at the present stage of the patent law, of equal force, which is that the construction of the patent must be in conformity with the self-imposed limitations which are contained in the claims, or, in the language adopted in *McClain* v. *Ortmayer,* 141 U. S., 419, 'if the language of the specification and claim shows clearly what he (the patentee) desired to secure as a monopoly, nothing can be held to be an infringement which does not fall within the terms the patentee has himself chosen to express his invention."

It is impossible to mistake the significance of these decisions. They mean that the claims of patents must be construed and applied according to the literal, plain meaning of their words. Nearly all patent controversies come at last to disputes about the meaning of words. It will help a little in that to consider what is the primary object of the claims in a patent. The statute grants to a patentee an exclusive right to make, use and sell something. What is that

something from which he is granted a right to exclude all the people of the United States except himself? He owes them the highest possible duty to let them know, so that they can respect his rights. The answer of the statute is that he must in his patent and as part of it "particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery." It follows that the words of a claim are to be taken and read in the sense in which they apply to and protect *the invention described in the specification.* When that appears clearly the meaning of the claim is clear.

That does appear in this case. The invention described in the specification is the concentrating table shown in Fig. 3 of the patent. It comprises two elements—a group of riffles of progressively increasing length, and an unriffled area adjoining their terminals—*one group and a single adjoining space.* The words of the claims describe the structure exactly; they protect the invention perfectly. The patentee is limited to the words which he has chosen taken in the sense in which they apply to his own invention. That is the meaning of the foregoing cases.

We can now take up the opinion of the District Court and see what reasons it gives for its judgment for the plaintiff, and whether they were good ones or not.

THE OPINION

In reading that document, which is found on pages 63 to 75 of the record, we cannot help feeling that the writer was a good deal at a loss to make up his mind

which way to decide the case. He was right in a large part of what he said, but finally rested his decision on a wholly immaterial and mistaken point. He recognized the true meaning of the claims in suit. He quoted them (Rec. p. 71-3) and said this about them:

> "While the language differs in each one of the specifications quoted, it is quite apparent from a reading of these claims that in the view of the inventor the smooth, plain, or unriffled area of the table constituted an important adjunct to the form and arrangement of riffles described, and discharged a function essential to the successful operation of his device. This is shown by the fact that in each and every instance in which he set forth and described his table, the form and arrangement of the riffles is described as being in association with a smooth or unriffled surface." (Rec. p. 73, lines 6 to 17).

But he thought Mr. Wilfley ought not to have limited himself so closely, and went on immediately to say:

> "But, assuming that the association of the riffled surface of the table with the smooth or unriffled surface was deemed important or even essential in the view of the inventor, yet if the essential feature of his device, which was new in principle and which in itself constituted a distinct improvement in the art of concentration, may be used in other combinations or with other devices but yet so as to discharge the same or an equivalent function, does the want of foresight in Wilfley in specifying its use in conjunction with such 'smooth' or unriffled surface' limit the protection afforded by his patent where his arrangement of riffles are similarly combined;

> that is, with a smooth or unriffled surface, or its mechanical equivalent? To answer this inquiry affirmatively would be to construe the patent as though it was 'for a narrow and specific improvement in an old art,' and nothing more than an improvement." (Rec. p. 73, line 17, to p. 74, line 3).

This was a mistake of law. We have cited cases *ad nauseam* to the proposition that the claims of a patent must stand as allowed by the Patent Office and accepted by the patentee. The court has no power to remedy his "want of foresight," as the District Court proposed.

He also fell into an error of fact in regard to the low, deflected riffles on the Deister. He thought that deflection was necessary to the operation of the table. He said on that subject:

> "I very much doubt if any table of the general type of the Deister and operated upon the same general principle could be successfully operated unless the riffles were arranged upon this plan.
>
> I am, therefore, persuaded that this diagonal arrangement of riffles is as essential a feature in the Deister table as in the Wilfley in the performance of its functions." (Rec. p. 71, line 7 to 15).

But in this he was mistaken. As we have pointed out on page 24 of this brief, the deflection downward of the shallow riffles on the Deister table is the final refinement of construction in it to secure the most perfect concentration. It was not necessary to the operation of the table. The riffles could have extended straight out to the concentrates discharge with sub-

stantially the same result. But Mr. Deister thought it would help a little to attract the last residue of sand over the riffles and hold the concentrates back to turn the riffles downward a little for the last few inches. The idea that the table would not work successfully without that deflection of the riffles was a total mistake. Not a witness testified to it. There was a great deal of controversy and a great deal of testimony about that zone on the Deister table—the space between the line B B and the concentrates discharge. Mr. Hodges testified that no work of concentration was performed in that zone; that concentration was complete when the material passed the line B B; that the 1-32nd inch high riffles were superfluous, and the space occupied by them was to be treated as though they were not there. It then became, as he thought, the equivalent of the smooth portion A of the Wilfley patent. But in all this he never made any point on the *deflected* position of the riffles, and manifestly could not. If that zone was to be treated as smooth space, it would not be because of the deflected position of the riffles, but because they performed no function of concentration. This is what Mr. Hodges said:

> "The space occupied by the 1-32nd inch thick riffles presents a relatively smooth, plain and unriffled surface which would be still smoother when in operation owing to the fact that the shallow terminals fill up to their full capacity with concentrates; no concentration takes place in the space occupied by those shallow riffles; the work of concentration is complete when the material reaches the line B B." (Rec. p. 185, last 2 lines, and p. 186, first 7 lines).

This quotation became one of prime importance to the defendant and we went to a world of trouble to refute Mr. Hodges. We hope the court will bear with us while we make this plain because this was the final ground of the decision against us in the District Court.

First, upon an inspection of a Deister table (any one) in operation there was plainly to be seen a constant flow of fine, white sand over the 1-32nd inch riffles across the riffles in the space between the line B B and the concentrates discharge. That meant that those parts of the riffles were doing concentration work just as the higher parts of the same riffles in the central portion of the table were, only the sand passing over them was extremely fine. All the coarser sands had been washed out before the material reached that part of the table. It was to remove that last remaining fine sand that the riffles were made so low. The court will find testimony on this point in the record from Gilbert H. Davidson, W. A. Moore, Rudolph Gahl, George Nord, Earle Schuyler and Gustave E. Hunt, all on pages 244 to 246 of the record. We content ourselves with these brief quotations:

Davidson, "Has seen sand with the naked eye passing over the low riffles on the Deister table."(Rec. p. 244).

Moore, "The process of concentration is not complete when the material crosses the line of the second stepdown in the riffles on the Deister table; you can see concentrates and sand passing over the riffles in

that part of the table; the sand is very fine and light colored." (Rec. p. 244).

Gahl, "The concentration of the material which passes the second stepdown is not complete at that point; some sand remains to be taken out; it can be seen passing over the low riffles." (Rec. p. 244-5).

Nord, "The concentration of material on the Deister table is not complete until it comes to the end where the concentrates go into the concentrates box; when the table is in operation sand can be seen passing over the thin riffles." (Rec. p. 245).

Schuyler, "Has noticed the part of the Deister table occupied by the very thin riffles; silica washes over those riffles; can see it when the table is in its regular and normal operation." (Rec. p. 245).

Hunt, "There is a continuous concentration taking place between the thin riffles all the time; the silica or sand can be seen with the naked eye passing over those low riffles." (Rec. p. 246).

Not that a clean cut and complete separation takes place between any two riffles at any time—all the sand in the space going over the riffle, and all the concentrates remaining behind in the riffle trough. The witnesses state that a trace of concentrates can be seen going over the riffles with the sand sometimes. But that is a characteristic of all concentration by flow over riffles. It is a separation of waste material from value time after time—that which goes over the riffles being mostly waste, but some value being kept back every time until finally it has all been extracted. The action here is such as to let nearly all the concentrates

between the low riffles keep moving on to the concentrates discharging apertures, and escape there. The quantity that reaches the lowermost riffle of the table is very minute. This evidence—the sight with the naked eye of the sand passing over the low riffles, testified to by the eight witnesses we have named, without contradiction in the record, is quite enough to refute expert Hodge's sapient opinion that no work of concentration is done by the low riffles on the Deister table. But we went further.

We made a set of observations of the most refined character upon the material passing between those low riffles. They are a trifle over a foot long. If a process of concentration is going on as the material passes between them two samples of the material taken from any one of the streams—one from the line B B and the other from near the concentrates discharge, ought to show a difference in richness. The sample taken from the end next the concentrates discharge ought to show more copper. And so it proved to be.

The facts are shown in the record on pages 242 last par., to 244, first paragraph and on page 256 there is noted the introduction of the exhibit drawing illustrating the method of taking the samples, which is here reproduced.

The manner of making the test and its result are shown in Mr. Kiddie's report, paragraph 3 on file in this case as an exhibit. We copy it as follows:

> "Paragraph 3.
>
> "In order to show that concentration was going on along the terminal riffles, the following method was employed. Two small scoops

of thin sheet copper were made, wide enough to fit between two of these riffles, with their edges filed sharp. These scoops were longer than they were wide and provided with a suitable handle. Two jets of water were arranged by means of a flexible rubber tubing provided with two pointed glass tips.

"Two men, each with a scoop and a water jet, took the samples. The two scoops were placed simultaneously between the same two riffles, one near either end with their sharp edges against the surface of the table and their long axes parallel to the riffles. With the water jets the concentrates lying between the two riffles from $\frac{1}{2}''$ to $\frac{3}{4}''$ in front of the scoop, were washed into the scoop and caught. This operation took the fraction of a minute, when the scoops were removed and the table again allowed to resume its normal work.

"Three sets of samples were taken in this way. In the first set, marked (1), 12 samples were taken on the 8th riffle, and 12 samples on the 12th riffle, numbered from the top of the table (nearest the feed box). These two riffles were selected because it could be seen that a moderate amount of sand was continually being washed over them.

"In the second set of samples marked (2) they were taken at every fourth riffle, beginning at the bottom of the table and working up to the top. This was repeated four times.

"(3) represents 20 samples taken more or less at random from riffles where an excessive amount of sand was being washed over.

"Samples taken between the terminal rifles on one Deister Table.

	Scoop A		Scoop B	
	% Cu.	% Ins.	% Cu.	% Ins.
(1)	12.44	59.26	20.60	32.68
(2)	18.42	37.26	24.76	16.16
(3)	22.42	21.70	28.22	7.00

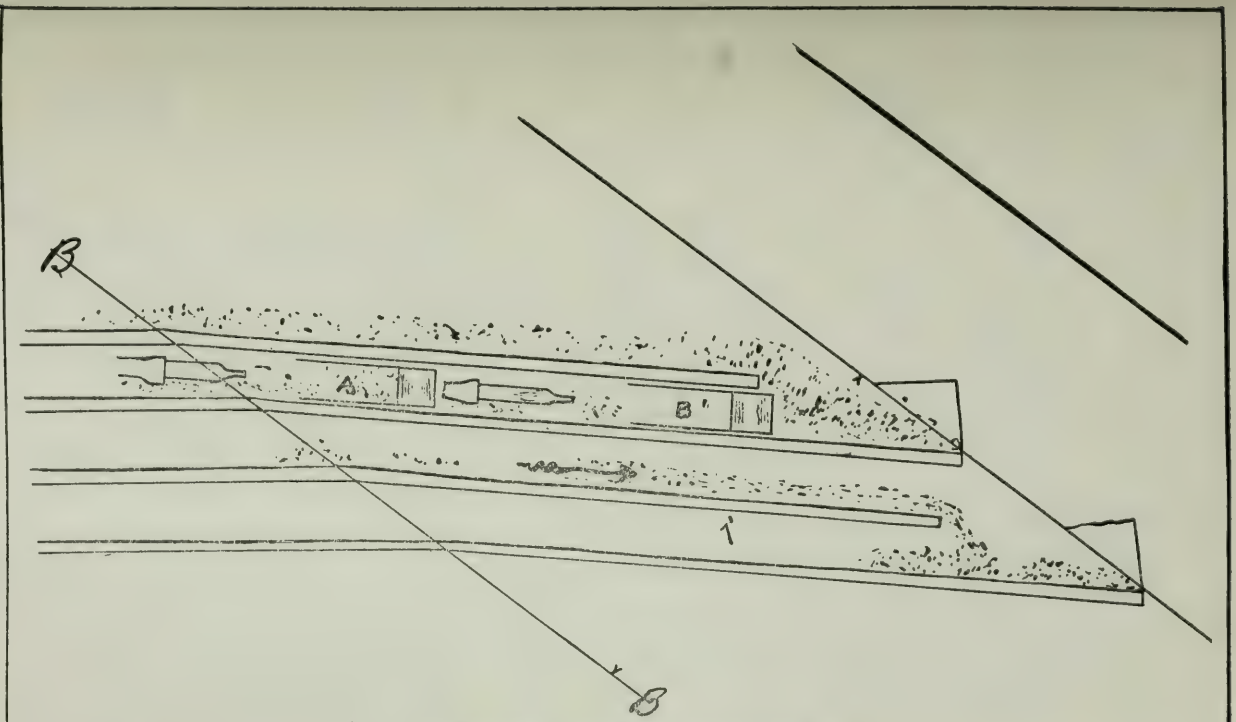


Diagram showing method of sampling Terminal Riffles on Deister Table

Scale 6' = 1'

"Before taking these samples, the table was set to throw the lines of concentrates approximately on the line following the end of the terminal riffles to the left of scoop A in the sketch.

"The above results show a very material amount of cleaning taking place between the two points at which samples were taken off. This is shown by the decrease in the percentage of insolubles in the concentrates with a corresponding increase in the percentage of copper, as they traveled along the terminal riffles toward the discharge point."

The painstaking thoroughness of this report is remarkable. It embraced the following samples:

12 From the 8th riffle on the table.
12 From the 12th riffle on the table.
36 From every 4th riffle from the bottom.
20 at random.
80 in all.

Taking these as a whole, they speak absolute truth as certainly as that commodity is attainable by human effort.

But it is not quite enough to refute this blunder of expert Hodges. The court said, in the quotation above from page 71 of the record, that in its opinion it was doubtful whether the Deister table, or any table operated on the same general plan, could be successfully operated unless the terminal riffles were arranged in the diagonal position. We say that in that view the court was proceeding without evidence. Part of our proof of that assertion lies in the fact that while expert Hodges, to whom the court refers by name on page

69, devoted much space to the discussion of that part of the Deister table—the zone between the line B B and the concentrates discharge, he does not at any time refer to the *mere position* of the deflected riffles as a matter of any significance or importance.

Mr. Hodges' testimony, not including that in rebuttal, occupies 18 pages in the record (page 185 to 204), neglecting the two lines on page 204. For instance, on pages 193-4 he discourses thus:

> "There is not only this relatively plain, smooth and unriffled surface practically surrounding the outlets for the concentrates but also the slightly deflecting channels formed by the thirty-second of an inch thick terminals of the riffles extending a few inches back toward the mechanism end, which presents a relatively smooth, plain and unriffled surface and a surface which has the function of relative smoothness; or, in other words, a surface which is smooth enough to permit the unobstructed side wash of the water from the wash-water box, and at the same time which must be rough enough to facilitate and augment the clinging tendency of the heavier concentrates to the table surface at the concentrates discharge end. This portion of the table at the concentrates discharge end, where the terminals of the advancing riffles are located, would, in the operation of the table, be still smoother, and it would physically appear, owing to the fact that these shallow terminals fill up to their full capacity with concentrates as they pass over this portion of the table." (Rec. p. 193, last par., to 194, first par.)

If Mr. Hodges had considered that the slight inclination toward the foot of the table of the low

riffles on the Deister table was a feature, which, of itself, contributed to infringement, he would have said so here. But the whole point of his argument is that the riffles in that zone are so *shallow* that they are, in effect, no riffles at all, and may be neglected, and that space treated as smooth, like the space A on the Wilfley table. We shall comment on his testimony from another standpoint at a subsequent part of this brief. Our object in quoting his testimony now is to show that he made no point on the *deflected position* of the low riffles as constituting a feature of infringement.

Hence, the controlling emphasis placed on the deflected position of the low riffles of the Deister table in the opinion of the District Court was without warrant in the record.

We submit the foregoing as a complete justification of the second assignment of errors on pages 102-3 of the record, which is in these words:

> "The Court erred in holding that the low and diagonally deflected riffles on the said Deister Concentrator No. 2 were an essential feature of said Deister Concentrator."

In the last paragraph of its opinion, on page 75 of the record, the District Court gave the following final reason for its judgment:

> "In the particular that the arrangement of riffles used on the Deister table is the equivalent of the advancing terminals on the Wilfley, I hold, therefore, that the Deister table is an infringment upon the Wilfley patent."

What is an equivalent in the sense of the patent law? It is a device which accomplishes the same result as another device in substantially the same way. If it does not accomplish the same result, of course it is not an equivalent. If it accomplishes the same result in a different way, then, of course, again, it is not an equivalent. The Wilfley and Deister tables accomplish the same general result—the separation of the mineral from the sand. But the final step of the process—the elimination of the last residuum of fine sand, they accomplish in different ways. The Wilfley does it by repeated washings along the diagonal line of riffle tips adjoining the space A and a final washing up on that space. The Deister does it by bringing the riffles down to an extremely low elevation—1-32nd of an inch, giving them a slight inclination toward the foot of the table, and then passing the material over them, and so keeping up the process of concentration by riffles to the last step. It is the same process as that carried on in those parts of the table lying back of the line B B—between that line and the head motion, only adapted to the material to be treated. We have proved by the testimony of the six witnesses given on pages 244 to 246 of the record and the experimental demonstration by Mr. Kiddie, testified to by him on pages 242-4, all of which are discussed in this brief, that the work of concentration goes on over the low deflected riffles of the Deister table along their whole length, so that the fine sand that is taken out on the Wilfley by washing on a smooth surface is taken out on the Deister by flowing across riffles.

But, it may be said, after you have eliminated all the sand you can by flow across your shallow riffles you wash out a residue at the last instant by water from your washboard, so that washing up is the last step on the Deister as well as on the Wilfley. Yes, it is. But while again the same result is reached, it is not reached in the same way. On the Wilfley it is by wholesale—all the output of the machine at once on a single space; on the Deister it is in minute subdivisions, on sixteen little spaces at the terminals of the short riffles of each pair.

Upon these authorities and arguments we submit that the District Court erred in holding that the deflection of the riffle terminals on the Deister table made them the equivalent of the advancing terminals on the Wilfley. Which justifies the third assignment of errors, which is in these words:

> "The Court erred in holding that the diagonal deflection of the ends of the riffles on the Deister Concentrator was the mechanical equivalent of the advancing terminal arrangement of the riffles on the Wilfley table." (Rec. page 103.)

But the most serious error of the District Court was in its construction of the patent in suit. After a long general discussion of the subject the Court said this:

> "It is claimed by the defendants that, conceding that the use of the riffles with advancing terminals did constitute a distinct step in the art of concentration, yet the patentee, Wilfley, has limited his invention in this regard to its use in combination with a 'smooth or

> unriffled surface' by associating the two in each instance in which he described his invention and attempted to set forth its function or functions in his application for his patent." (Rec. page 71, third par.)

Following this the opinion, on pages 71-3, sets out in full the three claims in suit which are immediately followed by this comment: (Rec. page 73.)

> "While the language differs in each one of the specifications quoted, it is quite apparent from a reading of these claims that in the view of the inventor the smooth, plain, or unriffled area of the table constituted an important adjunct to the form and arrangement of riffles described, and discharged a function essential to the successful operation of his device. This is shown by the fact that in in each and every instance in which he set forth and described his table, the form and arrangement of riffles is described as being in association with a smooth or unriffled surface." (Rec. p. 73, lines 6 to 17.)

Which is quite true. But this true statement is immediately followed by the following erroneous one —the fundamental error of the opinion, in these words: (Rec. pages 73-4.")

> "But, assuming that the association of the riffled surface of the table with the smooth or unriffled surface was deemed important or even essential in the view of the inventor, yet if the essential feature of his device, which was new in principle and which in itself constituted a distinct improvement in the art of concentration, may be used in other combinations or with other devices but yet so as to discharge the same or an equivalent function,

> does the want of foresight in Wilfley in specifying its use in conjunction with such 'smooth or unriffled surface' limit the protection afforded by his patent to cases where his arrangement of riffles are similarly combined; that is, with a smooth or unriffled surface, or its mechanical equivalent? To answer this inquiry affirmatively would be to construe the patent as though it was 'for a narrow and specific improvement in an old art,' and nothing more than an improvement." (Rec. p. 73, line 17, to p. 74, line 3).

This attempt of the court to amend the claims on the ground that it was a "want of foresight" in Wilfley to make them as narrow as they are is without the least warrant of law. The whole tenor of the array of cases with which we have taxed the forbearance of the court is to the point that a patentee is bound by his claims as he accepted them from the Office. One sentence from McClain vs. Ortmayer, 141 U. S., 419, in which Justice Brown said this, on pages 423-4 of the report is pat to the point here.

> "While the patentee may have been unfortunate in the language he has chosen to express his actual invention, and may have been entitled to a broader claim, we are not at liberty, without running counter to the entire current of authority in this court, to construe such claims to include more than their language fairly imports."

The claims in suit are all based on Fig. 3 of the patent. We do not think it would have been possible for Mr. Wilfley to make any broader claims upon it than those allowed him. But however that is, he is bound by those he accepted beyond the

power of the District Court to help him out on the ground of "want of foresight."

And this is our justification for assignments of error Nos. 4 and 5 on page 103 of the record; and enough in our humble judgment to require a reversal of the judgment below.

It should be noted here (by way of parenthesis) that the court has before it two appeals submitted as a single case: one by the "Detroit Copper Mining Company of Arizona" and the other by the "Arizona Copper Company." The two companies were sued separately and appealed separately. The evidence was taken in the case against the Arizona Company, but by stipulation was to apply to both cases. Hence, the court will find in the record *two* assignments of error identically alike, one by each appellant—one on pages 102-3 and the other on pages 104-5.

It would not be relevant to the question of infringement to show that the Deister table is a better concentrator than the Wilfley. It might be that and still be an infringement of the patent. But when the District Court endorses the plaintiff's contention that the claims in suit are entitled to a favorable construction on the ground of the superior excellence of the table, that question becomes a material one. In laying out the case for decision the District Court on the first page of its opinion as printed in the record stated the respective contentions of the parties as follows: (Rec. p. 64; lines 15 to 26.)

> "It is contended on behalf of the plaintiff that the Wilfley patent embodied a new

> principle in the art of wet concentration of ore and the machine patented was the first to perform a new and definite function in the practice of ore dressing, so as to produce both increased efficiency and capacity. On the other hand, it is contended on behalf of the defendants that the Wilfley patent was for a narrow and specific improvement in an old art, and therefore to be construed and limited accordingly, and as so construed does not cover any essential feature embodied in the Deister machine."

Later on, near the close of the opinion, the court said this: (Rec. p. 74; lines 4 to 17.)

> "Whether we regard the Wilfley device as a distinct step in the art of wet concentration of ores, it certainly introduced a new principle which was more than a mere improvement on something therefore known into the art. If an improvement, it was therefore of the kind which, under well-settled rules of construction, is not to be limited strictly to the precise device or arrangement described in his application, but is to be given such a construction as will at least protect the inventor in the use of that feature of his device which is new in principle and which is the essence of his invention, as against others who may use it, or its mechanical equivalent, to produce the same result."

Is it true, as the court found, that the Wilfley patent embodied a new principle in the art of wet concentration of ores and that the machine patented was "the first to perform a new and definite function in the practice of ore dressing so as to produce both increased efficiency and capacity"? It is not.

As often happens when men talk loosely, on the bench or off it, truth and error are mixed up in this statement. In a sense the Wilfley table does embody a new principle. If it did not, it would not be patentable. We shall discuss that subject in a later part of this brief.

The error is in the statement that some principle or function produced "both increased efficiency and capacity" in the Wilfley concentrator. That is a claim to be proved by evidence. Who testified to it? Not any one. There is not a particle of evidence in the record that the Wilfley concentrator is superior in efficiency or capacity to any other. On the contrary, there is express evidence that it is inferior to the Deister. In January, 1909, John Kiddie, expert assayer of the Arizona Copper Company, made a comparative test of a Wilfley and a Deister machine under the direction of the general manager of the company. The test extended over a period of twelve days. All the facts of the test were tabulated and the record put in evidence. (Rec. page 246-7.)

This record is on file as an exhibit, and we reproduce it here.

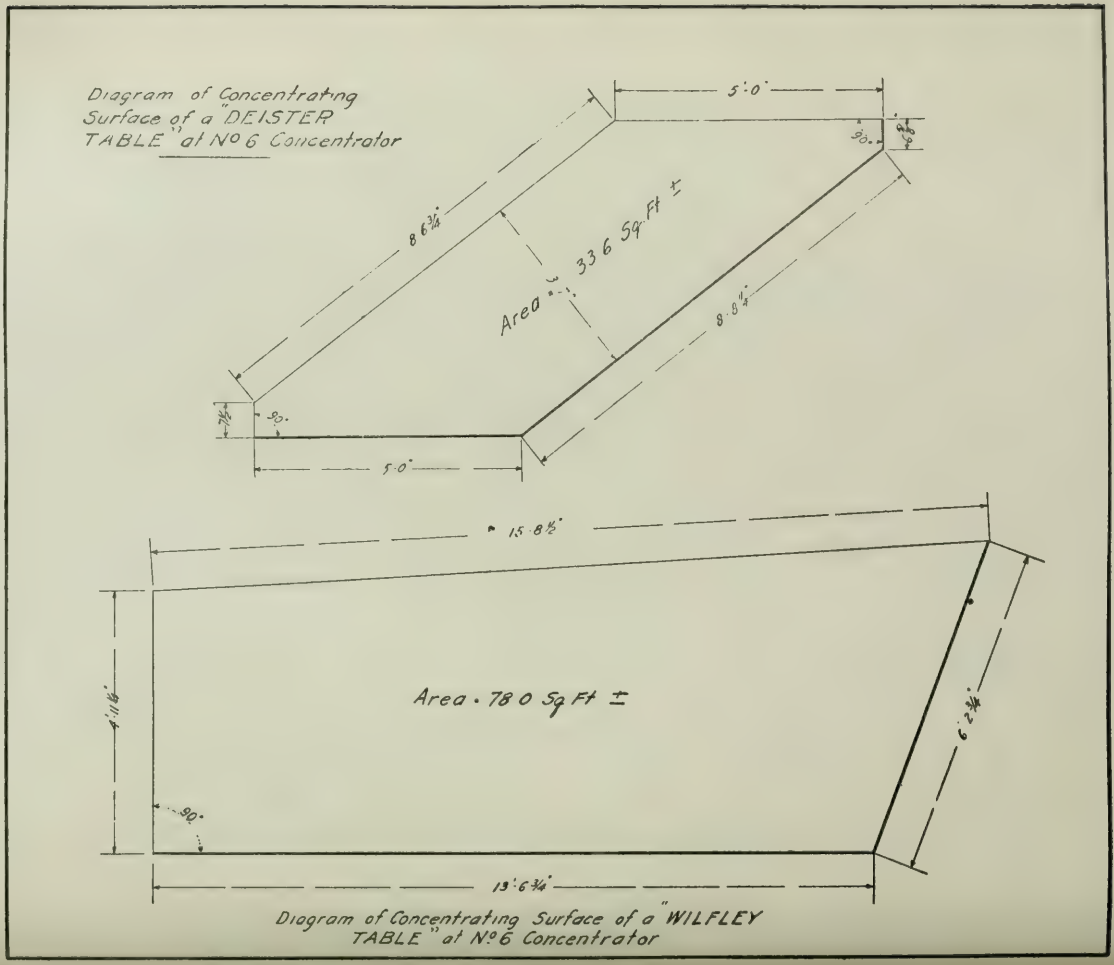
It will be found in the testimony of John Kiddie, page 246 to 247 of the printed record. He embodied the results of the test in a table which was put in evidence, and is on file amoung the defendant's exhibits sent up by the clerk of the District Court. This test was made in January, 1909, as a matter of business, and not for the purpose of evidence in this case or any other. It was made by direction of the general

Date	Machine	Hrs Run	Tons Feed per 24 hours	Pounds Dry Concentrates	Assay of Concentrates	Pounds Copper in Concentrates	% Relative Saving in Terms of Wilfley	Approx Extraction	Assay of Heads	Assay of Tails	% Solids in Feed	Stroke in Ins.	RPM	Table
1/16/09	Deister	2½	12.24	297 3/4	17.28	51.45	115.1	67.6	2.86	1.03		3/4	280	3/32"
"	Wilfley	"		249 1/2	17.89	44.63	100.0	60.0	2.86	1.24		1	262	
1/17/09	Deister	2	12.52	211	17.93	37.83	108.3	61.4	2.89	1.24	3.18	1 3/16	283	3/4"
"	Wilfley	"		210	16.63	34.92	100.0	57.0		1.38		1		
1/18/09	Deister	2	9.94	255	13.03	33.23	119.2	79.0	2.62	0.83	2.49	1 3/16	280	1"
"	Wilfley	"		208 3/4	13.35	27.87	100.0	68.0		0.97		1		Forward end of high Riffles removed.
1/19/09	Deister	2	12.69	302 3/4	16.25	49.20	118.5	70.0	3.22	1.12	2.84	1 3/16	288	1¼"
"	Wilfley	"		262 1/4	15.82	41.49	100.0	63.0		1.37		1		6.1 20 - 41.5 40 - 13.7 60 - 6.5 80 - 4.5 100 - 6.8 200 20.9 - % Wt.
1/20/09	Deister	2	13.17	354	16.00	56.64	121.5	70.5	3.51	1.23	2.74	1 3/16	281	3/4"
"	Wilfley	"		310	15.03	46.59	100.0	63.3		1.51		1		0.09 1.23 2.64 4.34 6.25 8.06 3.52 - % Cu
1/21/09	Deister	2	8.52	260 1/2	12.70	33.02	120.8	74.2	2.90	0.83	2.90	1 3/16	281	3/4"
"	Wilfley	"		212 1/4	12.87	27.35	100.0	67.6		1.11		1		
4/22/09	Deister	2	16.37	298	11.62	34.63	117.6	59.0	2.13	0.98	2.75	1 1/16		3/4"
"	Wilfley	"		231	12.74	29.43	100.0	51.5		1.13		1		
1/23/09	Deister	2	13.20	288	15.80	45.50	106.0	69.3	2.97	1.05	2.54	3/4	283	1"
"	Wilfley	"	13.46	248	17.30	42.90	100.0	64.5		1.19		1		
1/24/09	Deister	1½	38.65	357	13.10	46.70	117.9	44.7	2.12	1.26	3.24	1 3/16	281	1¼"
"	Wilfley	"		260	14.20	39.60	100.0	36.5		1.42		1		7.0 20 30.6 40 10.4 60 9.5 100 7.4 200 35.1 % Wt 1.54 1.45 2.04 2.90 4.25 2.08 - % Cu
2/1/09	Deister	2	19.84	343	12.60	43.22	111.0	61.1	2.10	0.91	1.62	1 3/16	281	1⅛"
"	Wilfley	2		315 1/2	12.30	38.81	100.0	57.1		1.00		1¼		Feed: Spigot of Cone hydr. Class
2/2/09	Deister	2	17.65	299 1/2	15.57	46.63	110.0	61.8	2.56	1.09	1.66	1 3/16	280	1⅛"
"	Wilfley	"		288 1/2	14.66	42.29	100.0	56.3		1.24		1¼		14.9 20 - 41.9 40 - 8.9 60 - 3.6 80 - 3.9 100 - 4.8 200 21.9 - % Wt. 1.14 1.35 2.99 3.12 3.90 5.00 3.00 - % Cu.
2/3/09	Deister	1½	25.50	268	12.74	34.14	136.6	52.1	1.99	1.04	2.35	1 3/16		1⅛"
"	Wilfley	"		195 1/2	11.12	21.74	100.0	35.5		1.37		7/8		
1/26/09	Deister	2	9.37	244	11.50	28.06	100.7	68.5	2.56	0.95	2.19	3/4	287	2"
"	Vanner	"		169	16.50	27.88	100.0	67.5		0.93		1	210	5.6 20 28.5 40 10.5 60 10.9 100 10.5 200 34.0 - % Wt. 1.10 1.01 1.79 3.92 5.32 2.78 - % Cu

Run of 1/24/09 - Measuring on Linolium, discharge end of Deister Table was ½" Lower than Feed end
" " 1/26/09 - " " " " " " " 1/8" Higher "

Direct Average of Tailings - Deister Table 1.05 % Wilfley Table 1.24 %
" " " Concentrates 14.55 % 14.49 %

manager of The Arizona Copper Company, one of the appellants in this case, before any Deister tables had been put into use in the mill, in order, manifestly, to ascertain the value of this new type of machine. Every precaution was taken to insure accuracy in every particular. By means of an automatic device the feed was divided equally between the two machines. The test extended over twelve days, with an average run of about two hours per day. That is, the machines were started and run two hours. Then the whole product of concentrates was taken off from each table, dried and assayed. Next day the same process was repeated. Mr. Kiddie states the facts fully in his deposition and explains the various columns of the table in which the test is summarized and which we here reproduce. Without going into details at length, it will be sufficient to call attention to the columns headed "Dry Concentrates," and "pounds of copper in concentrates," to see how far Deister was ahead in the race. All other points of comparison, however, are merged in column headed "Savings in terms of Wilfley." In that column the total saving of copper from the pulp fed to the Wilfley machine is represented arbitrarily by 100, and the total saving by the Deister machine stated in the form of a per cent. upon 100. This furnishes a perfect basis of comparison. If in any run the saving made by the Deister table were exactly equal to that made by the Wilfley it would be denoted by 100. If less, by a minus figure, as -10; if more, by a figure above 100. The Deister figures in the columns are all more than 100. And they show


Diagram of Concentrating Surface of a "DEISTER TABLE" at No 6 Concentrator
5:0"
8 6¾"
Area = 336 Sq Ft ±
8:8½"
7½"
80.
5:0"
15:8½"
4:11½"
Area = 780 Sq Ft ±
6:2½"
90.
13:6¾"
Diagram of Concentrating Surface of a "WILFLEY TABLE" at No 6 Concentrator

an average of approximately 116. That is, the Deister machine extracted nearly one-sixth more copper from the same pulp.

But the Deister table beat the Wilfley in other respects, also. Gustavus E. Hunt, superintendent of the mill of the Detroit Copper Mining Co.—one of the appellants here, testified that he was familiar with Deister Concentrator No. 2; that 38 Wilfley tables were used in that mill; that he had opportunity to compare the Wilfley and Deister concentrators at work; that he made no distinction between them as to amount of work, but gave them the same load each. (Rec. page 246.)

He produced drawings showing the dimensions of both tables, which we reproduce here.

The significance of these comparisons of size, weight and working capacity lies in the fact that these machines are all used under cover—hundreds of them, in one great concentrating mill, where space and power are valuable. The ore concentrator that will do the most work in the least space and with the least outlay of power is the best.

In the next to the last paragraph of the opinion on page 74, last four lines, and page 75, first three lines, of the record, the court said this:

> "It seems to me that the Wilfley patent, in view of its history and its importance, should be construed, notwithstanding the language used by the inventor in his application as covering the appropriation by the Deister table of this essential feature of the Wilfley table, and that, therefore, the former

> is an infringement pro tanto of the Wilfley patent."

This is an error, both in fact and law. The Wilfley table was not in fact superior to any other, as we have shown. And if it had been, it was the duty of the court to construe and enforce the claims of the patent according to the rules of the law. Those words "notwithstanding the language used by the inventor in his application" express a license which the court had no right to take. If we are right in this, it is our justification of the sixth assignment of error, which is in these words:

> "6. The Court erred in holding that in view of the history and importance of the Wilfley patent in suit it should be construed notwithstanding the language used by the inventor as covering the appropriation of this essential feature of the Wilfley table."

This disposes of all the errors assigned except Nos. 1, 7 and 8, which are in these words:

> "1. The Court erred in holding that the Deister Concentrating Table No. 2, the machine which was the subject of the litigation, was an infringement of the patent in suit."
>
> "7. The Court erred in denying the defendants' petition for rehearing."
>
> "8. The Court erred in rendering judgment for the plaintiff."

As to these, the first and eighth are in general terms, and we offer this whole brief in support of them. The petition for rehearing referred to in the seventh is in the record at pages 76 and 77, and was overruled by

the court, erroneously, as we think. But the first, second, third and sixth reasons assigned for a rehearing are identical in effect with errors assigned here which we have discussed; and we can discuss more conveniently the matters of the fourth and fifth in another connection a little later.

This concludes our discussion of the opinion of the District Court.

As we remarked at the outset, this comparison of the merits of the two tables would not be material upon the issue of infringement if it were not for the fact that the District Court accepted as true the claim of counsel for the plaintiff that the Wilfley table possessed "both increased efficiency and capacity" and gave weight to that supposed fact in its findings and judgment for the plaintiff. That action by the court makes it material to know whether there was any foundation in the testimony for the assumption on which it proceeded. We have now shown that there was not; that the contrary was the fact.

This brings us to a sort of stopping place at which we may pause a moment and see where we are. We have done this.

1. We have laid before the court full and accurate descriptions of the Wilfley and Deister tables for comparison.

2. We have shown by careful analysis of the language of the Wilfley patent, taken in connection with Fig. 3, that it describes a simple, clean cut, unmistakable two-part combination of a group of riffles with a

relatively short one at the top and the others increasing progressively in length to the last one at the bottom, and a single unriffled space adjoining the terminals of all the riffles.

3. We have studied and analyzed the claims in suit.

4. We have compared the claims with the Deister table with the result that it appears that it does not infringe.

5. We have discussed the opinion of the District Court at length with the result that it appears clearly to be erroneous both in fact and law.

Is that not enough to reverse the decision?

THE EXPERTS

This all seems to be so plain that one can not help wondering how it happened that the District Court found for the plaintiff. Experts. That's the explanation. The defendant's case was smothered under depositions of experts. Hundreds of pages of the big record were filled with them. The record in this court, condensed as it is, and had to be under the new equity rules, contains depositions of five experts, aggregating sixty-four pages.

We are not intending by these remarks any wholesale condemnation of the testimony of experts in patent cases. There are cases in which it is highly important. Sometimes a machine or process is so intricate that the court cannot understand it without the help of one skilled in the business. Such a question might arise in a suit on a patent for an improvement in locomotive engines. Or questions may arise requiring expert

knowledge of chemistry or electricity, or the like, for their solution. But experts who are mere jugglers with words, who have no rare or useful knowledge about anything, and whose sole business it is to make words mean anything you want them to were the bane of the old patent practice. If the new equity rules never bear any other fruit of good results, the reform which they have brought in the introduction of expert testimony in patent cases will be enough for their justification. The testimony of the experts was a fruitful source of error in this case. Nearly all the plaintiff's witnesses undertook the role of experts, but there were two to whom alone we shall refer. They are Robert H. Richards and Vernon E. Hodges. Richards led the way. He set the pace, and the others followed. This was his first speech:

> "The Wilfley table was a great advanced stride and initiated a new era in concentrators: Wilfley put his riffles on with the diagonal ending—the advancing terminals, as they are called, and from a structural point of view also tapered his riffles and so added to the strength of the machine in getting an automatic control of the line of change of detention by such means." (Record, 143, last 4 lines to page 144, first 4 lines).

A little later, on cross examination, he introduced some new words into the vocabulary of the case:

> "The result of Wilfley's discovery divides the table into three parts—roughing plane, cleaning plane and diagonal of mechanical control of change of detention; this is the great advance that Wilfley has made, the

> advance that has made his table the forerunner of a new type of table." (Record, 158, last two lines, page 159, first 5 lines.

Why does he go round the bush to invent these expressions? If a man wanted to talk candidly about the Wilfley table, he would use the words that belong to it—riffles, riffled and unriffled, smooth, or plain space. It is easier to say "riffle" than "roughing plane." There's a cat in the meal tub somewhere. This word juggler is coining these innocent phrases to use later on. We shall see.

The words "smooth, plain and unriffled" are used many times in the specification and claims of the Wilfley patent. They were embarrassing words for counsel and experts to deal with in trying to make out infringement against the Deister table. But expert Richards was equal to it. On page 162 he says:

> "When the word 'smooth' or 'unriffled' is used in this art it would have the meaning 'smooth enough' or unriffled enough' for the performance of the function which it is calculated to perform, in speaking of the roughing surface as compared with the cleaning surface of the table; it is not necessary on either the Wilfley or the Deister table, in practical operation, to perform the functions of advancing terminals of riffles terminating on a smooth surface that the smooth surface should have any definite dimension or form, only sufficiently smooth and large to accomplish the function described; (here the cat emerges from the tub) the Deister table is a structure provided with a plain or unriffled portion of the suitable area located at the extremities of the riffles for the purpose specified in the Wilfley patent." (Record, 162, first 16 lines).

Mr. Wilfley follows the lead of his expert, and says on pages 175-6 of his own table:

> "The Wilfley table is provided with a roughing surface sufficient to catch, stratify and direct all the concentrates and enough of the tailings to secure protection to the concentrates up to the line of final separation." (Record, 175, last line and 176 first 4 lines).

And then of the Deister:

> "The Deister table is provided with a roughing surface, with riffle cleats and channels sufficient to catch, hold, stratify and direct all the mineral and enough of the gangue to protect the mineral up to the line of final separation." (Record, 176, lines 9 to 13).

It would be a safe bet that Mr. Wilfley never called the riffled portion of his table a "roughing surface" until he learned it from Richards.

VERNON E. HODGES

Now comes the professional expert. Richards was not that. He was a college professor, doing a little experting on the side. His associates called him "Doctor," and when it comes to prescribing words for a sick infringement case he certainly deserves the name. But Hodges makes no such pretentions. His business is to swear to opinions on any side of any case about the meaning of words or anything else. He justified his devotion to business in this case. He started out with this pronouncement on pages 188-9.

> "In the Wilfley table the esential characteristics are that of a relatively rough area, which

> area is the riffled portion where the initial work of concentration is performed and the relatively smooth portion where the final separation takes place, a portion which must be smooth enough to permit the side-flow of wash water to wash away the lighter silica which arises to the top and at the same time sufficiently rough to cause the heavier concentrates to cling to this surface and permit the wash-water to flow over it, so that the concentrates retain their position on the surface by reason of a sufficient roughness in it, while the lighter weight is carried over the tailings discharge side of the table." (Record, 188, last 9 lines, to page 189, first 6 lines).

With these manufactured words of description in hand it was an easy thing for him to find infringement in the Deister table. Thus on page 192:

> "I find the same main characteristics of relatively rough and smooth areas or riffled and relatively unriffled areas in this Deister table." (Record, 192, lines 17 to 21).

And on page 193, this:

> "The inclined surface of the wash board of the Deister table as represented by Complainant's Exhibits Nos. 5 and 6, is simply a portion of the so-called smooth, plain and unriffled surface of the Wilfley table reduced to a minimum." (Record, 193, lines 6 to 10).

That is, the unriffled space on the Wilfley table is not really a smooth, plain and unriffled surface at all, as the specification and claims call it, but only a "so-called."

Then follows, on pages 193-4, Mr. Hodges main speech—his *chef d'oeuvre,* in these words:

> "There is not only this relatively plain, smooth and unriffled surface practically surrounding the outlets for the concentrates but also the slightly deflecting channels formed by the thirty-second of an inch thick terminals of the riffles extending a few inches back toward the mechanism end, which presents a relatively smooth, plain and unriffled surface and a surface which has the function of relative smoothness; or in other words, a surface which is smooth enough to permit the unobstructed side wash of the water from the wash water box, and at the same time which must be rough enough to faciliate and augment the clinging tendency of the heavier concentrates to the table surface at the concentrates discharge end. (Record, 193, last par. to 194, first 11 lines).

From there to the end of his testimony on page 204 he occupies himself with an elaborate attempt to explain away the claims of the Wilfley patent through which we will not follow him except to note that his last word (on page 204) is to repeat his insult to the"Wilfley's 'so-called' 'smooth, plain and unriffled' surface."

We all know that it was the habit of patent experts under the old practice to stretch and strain the words of claims to make them fit their theories of cases. But who ever heard before of such distortion of language as this? To discard the plain words of the patent—"riffled" and "unriffled," which describe perfectly the configuration of the Wilfley table deck, and substitute for them the vague phases "relatively rough" and

"relatively smooth", and then say that because the riffles on the Deister table are higher at the head motion end than at the concentrates discharge end those parts are therefore relatively rough and relatively smooth, and hence the Deister table infringes the Wilfley claims. No witnesses testified in the District Court that the Deister table infringed except the experts; and this is the way they did it. And this stuff is sworn to and offered as evidence in a court of justice, and accepted and acted on and a decree of infringement rendered. Will not this court be eager to reverse such proceedings as these?

It is refreshing to turn from this wicked travesty of the law to the dignified and clear utterance of the Supreme Court in these two old patent cases.

Corning v. *Burden,* 15 Howard, 522, was a suit on a patent for a machine for rolling puddle balls in the manufacture of iron. On page 270 of the opinion the court said this on the subject of the functions of experts in patent cases:

> "The refusal of the court to hear the opinion of experts, as to the construction of the patent, was proper. Experts may be examined as to the meaning of terms of art on the principle of, *'cuique in sua arte credendum,'* but not as to the construction of written instruments."

To the same purport is *Winans* v. *N. Y. & Erie R. R. Co.,* 21 How., 88, which was a suit on a patent for improvement in railroad passenger cars. On pp. 100-1 the court said this on the subject of experts:

"Experts may be examined to explain terms of art, and the state of the art, at any given time. They may explain to the court and jury the machines, models, or drawings exhibited. They may point out the difference or identity of the mechanical devices involved in their construction. The maxim of '*cuique in sua arte credendum*' permits them to be examined to questions of art or science peculiar to their trade or profession; but professors or mechanics cannot be received to prove to the court or jury what is the proper or legal construction of any instrument of writing. A judge may obtain information from them, if he desire it, on matters which he does not clearly comprehend, but cannot be compelled to receive their opinions as matters of evidence. Experience has shown that opposite opinions of persons professing to be experts may be obtained to any amount; and it often occurs that not only many days, but even weeks, are consumed in cross-examinations, to test the skill or knowledge of such witnesses and the correctness of their opinions, wasting the time and wearying the patience of both court and jury, and perplexing, instead of elucidating, the questions involved in the issue."

This closes what may be called the first division of this brief. We have reached twice already what seemed to be a logical end of the argument. First, when on page 34 ante, we had shown as we thought by analysis of the Wilfley patent and its claims that the Deister table did not infringe it. Then again, when we had demonstrated, as we believed, the errors of the opinion of the District Court on page 67. Surely a judgment based on an opinion which was so far

erroneous both in fact and law must be wrong. And now, most of all, that we have shown that there was no evidence of infringement except the testimony of experts resting on a distortion of words scarcely less than criminal in its wickedness.

But there is another view of the subject without which the argument which we wish to make will be incomplete. It rests on a line of cases to which we have not yet referred, and to which we now ask the attention of the court. The most important one of these is *Railway* v. *Sayles,* 97 U. S. 554, decided in 1878. It is the most important patent decision made in recent years. The suit there decided was for infringement of a patent to one Tanner as assignee of Thompson and Bachelder for improvement in railroad car brakes. The gist of the opinion is in the following extracts; first from pages 556-7, as follows:

> "Like almost all other inventions, that of double brakes came when, in the progress of mechanical improvement, it was needed; and being sought by many minds, it is not wonderful that it was developed in different and independent forms, all original, and yet all bearing a somewhat general resemblance to each other. In such cases, if one inventor precedes all the rest, and strikes out something which includes and underlies all that they produce, he acquires a monopoly, and subjects them to tribute. But if the advance towards the thing desired is gradual, and proceeds step by step, so that no one can claim the complete whole, then each is entitled only to the specific form of device which he produces, and every other inventor is entitled to his own specific form, so long as it differs

from those of his competitors, and does not include theirs.

The opinion then goes on to mention several railroad car brakes prior to the invention of Thompson and Bachelder, specifying in particular, on page 559, two, in these words:

> "Without noticing those inventions, the dates of which are disputed, it is sufficient to refer to two instances in point, the existence of which before 1846 cannot be seriously controverted. We refer to those known as the Springfield brake and the Millholland brake. These brakes may not have been, and were not, so perfect as that of Thompson and Bachelder, and others constructed at a later period; but they were used, and used successfully; sufficiently so, at least, to have sustained patents for inventions, had patents been applied for."

And finally, on page 561, the place of Thompson and Bachelder in the art is summed up as follows:

> "But their construction and use, though with limited success, are sufficient to show that Thompson and Bachelder were not the pioneers in this field of improvement, and that they were not the originators of the double brake, nor of the use of rods, chains, and similar appliances for connecting the brake systems of two trucks under a car. They invented a particular apparatus for doing the desired work; and they can only claim their particular apparatus, or that which is substantially the same."

One passage in the first quotation above compresses so much in so little space, and states in so

few words a principle of such wide application that it has become famous. It is this:

> *"In such cases, if one inventor precedes all the rest, and strikes out something which includes and underlies all that they produce, he acquires a monopoly, and subjects them to tribute. But if the advance towards the thing desired is gradual, and proceeds step by step, so that no one can claim the complete whole, then each is entitled to his own specific form, so long as it differs from those of his competitors, and does not include theirs."*

This legal proposition has had a unique history. Since its promulgation in 97 U. S. (1878) it has been cited with approval in *fifty-five decisions of federal courts*. We are not asking the court to take our word for that. To dig up that number of cases is beyond our industry. We have it from Rose's Notes, Vol. IX., page 580. That indefatigable author has there, within the limits of two pages, given specific reference to every one of those fifty-five cases.

A statement of a rule of law so concise and yet so comprehensive as that which we have quoted from *Railway* v. *Sayles,* may well be called a theorem—Bradley's theorem.

It would be unreasonable to follow Mr. Rose at length through the cases cited by him approving Bradley's theorem. But the case of *Railway* v. *Sayles* and the place which it holds in the law have a highly important—we might say controlling bearing on the questions to be discussed here, and we beg the court's forbearance while we refer specifically to a few of them.

In *Duff* v. *Sterling Pump Co.*, 107 U. S. 636, the patent was for an improvement in washboards. The improvement consisted in substituting for the continuous transverse ribs, or raised projections of the old washboard a surface both longitudinally and transversely ribbed or corrugated; the effect being to produce a surface studded with small *pyramidal* projections. The defendant's washboard was provided with *diamond-shaped* projections each bounded by diagonal grooves or depressions.

The court did not question the validity of the patent sued on, but after referring to prior patents to Galusha and Safford, and Crihfield, said:

> "The case is one where, in view of the state of the art, the invention must be restricted to the form shown and described by the patentee. In the field of washboards made of sheet metal, with the surface broken into protuberances formed of the body of the metal, so as to make a rasping surface, and to strengthen the metal by its form, and to provide channels for the water to run off, Todd was not a pioneer. He merely devised a new form to accomplish these results. *Railway Company* v. *Sayles,* 97 U. S. 554. The defendant adopts another form. Under such circumstances the Todd patent cannot be extended so as to embrace the defendant's form."

If it were only to find a strong case in point the argument might stop here. The deck of an ore concentrator is as purely a matter of form (configuration) as the surface of a washboard. The statement of the Supreme Court that its prior decision in *Railway* v. *Sayles* is to be taken as controlling in the washboard

case would well support the argument that it must also be taken as controlling in cases relating to the decks of ore concentrators. But we are dealing with a class of inventions of peculiar character, inventions which, as we shall undertake to show, occupy a field by themselves unlike any other field of invention, and one in which Justice Bradley's theorem has a peculiar and controlling authority.

Parsons v. *Colgate,* 15 Fed. 600. The suit was on a patent for an improved soap. The soap was made from a product of petroleum. Others had made soap from petroleum before him. The court turned him down in these words, on page 604:

> Had he been the first discoverer of the use of petroleum products in soap, he might, perhaps, by this patent, cover every form of such use of everything known as residuum not actually charred in this art; but as he was not, he is only entitled at the most to the particular *form* which he discovered the use of and patented. *Railway* v. *Sayles,* 97 U. S. 554.

Strobridge v. *Smith Wooden-Ware Co.,* 46 Fed. 922. The suit was on a patent for an improvement in coffee mills. The patentee was not a pioneer in that art. After pointing out that fact, the court said in the opinion, on page 924:

> Furthermore, Strobridge was not the first to devise a coffee-mill with the hopper suspended within the box. Such mills had already been in public use and upon sale. Strobridge was no more than a mere improver of an old mechanism, and therefore entitled only to his own specific *form* of device. *Rail-*

way Co. v. *Sayles,* 97 U. S. 554; *Duff* v. *Pump Co.,* 107 U. S. 637, 2 Sup. Ct. Rep. 487.

Adams Elec. Ry. Co. v. *Lindell Ry. Co.,* 77 Fed., 432. (U. S. C. C. A., Eighth Circuit). The suit was for alleged infringement of a patent for improvement in electric motors. The improvement claimed was in means for mounting an electric motor on a car. After an extended review of the history of the art the court said, on page 440 of the report:

> One who invents and secures a patent for a machine or combination which first performs a useful function is protected thereby against all machines and combinations which perform the same function by equivalent mechanical devices; but one who merely makes and secures a patent for a slight improvement on a device or combination, which performs the same function before as after the improvement, is protected against those only who use the very improvement that he describes and claims, or mere colorable evasions of it. If one inventor precedes all the rest, and strikes out something which includes and underlies all that they produce, he acquires a monopoly, and subjects them to tribute. But if the advance towards the thing desired is gradual, and proceeds step by step, so that no one can claim the complete whole, then each is entitled only to the specific form of device which he produces, and every other inventor is entitled to his own specific form, so long as it differs from those of his competitors, and does not include theirs. *Railway Co.* v. *Sayles,* 97 U. S. 554, 556.

After an extended discussion of the art the court on page 448 made this application of the principle enunciated in *Railway Co.* v. *Sayles:*

> These facts have borne the conclusion in upon our minds with compelling force that Adams cannot be held to be a pioneer inventor, nor his patent to be of primary character, in the art of mounting electric motors to propel cars. This is not a case where Adams preceded all the rest, and struck out something which included and underlay all that they produced. It is a case in which the principle to be applied, and the mechanical elements to be used, were all old and well known. Many minds were independently striving to accomplish the same purpose. Adams formed and patented one combination. Edison, Finley, and Sprague devised and used others. Each is entitled to his own form so long as it differs from that of his competitors and does not include theirs, and neither is entitled to subject to tribute those whose combinations are not mere evasions of his own. The franchise of Adams was limited by the state of the art to the specific combination he described and claimed in his patent, and to palpable evasions of it.

Corser v. *Brattleboro Overall Co.,* 93 Fed. 805. Suit was for infringement of patent for improvement in overalls. The court said on pages 806-7:

> As overalls, and overall backs and fronts, and suspenders, wide and otherwise, were all old, the plaintiff could have a valid patent only for his specific improvements upon them in these respects. *Railway Co.* v. *Sayles* 97 U. S. 554.

Diamond Rubber Co. v. *Consol. Rubber Tire Co.,* 220 U. S., 428. This was the hard-fought Grant Rubber Tire case—one of the few cases to reach the Supreme Court by *certiorari.* The patent was sus-

tained. But in the course of the opinion the court, on page 435, refers to *Railway Co.* v. *Sayles* with this recognition of the principle established by it:

> In other words, the invention may be broadly new, subjecting all that comes after it to tribute (*Railway Co.* v. *Sayles,* 97 U. S., 554, 556); it may be the successor, in a sense, of all that went before, a step only in the march of improvement, and limited, therefore, to its precise form and elements, as the patent in suit is conceded to be."

We have been standing mainly, so far, on the authority of *Railway* v. *Sayles* and cases which expressly follow it and refer to it. And certainly those cases are a sufficient foundation to build an argument on. Take it all in all, *Railway* v. *Sayles* is undoubtedly the greatest patent case in the reports. But the principle of restricting improvement patents to a narrow application of their claims was not original with that case. It runs far back into the history of the law. The leading case, so far as our researches have gone, is *McCormick* v. *Talcott,* 20 Howard 402, decided in 1857. The suit was upon a patent for a device called a "divider" employed in a reaping machine to separate the standing grain from that in the path of the machine, so that the stalks to be cut would not be entangled with those to be left standing. The question to be decided and the principle to be applied in deciding it are thus stated by the court on pages 404-5 of the report:

> "In order to ascertain whether the divider used by defendants infringes that of the complainant, we must first inquire whether Mc-

> Cormick was the first to invent the machine called a divider, performing the functions required, or has merely improved a known machine by some peculiar combination of mechanical devices which perform the same functions in a better manner."
>
> "If he be the original inventor of the device or machine called the divider, he will have a right to treat as infringers all who make dividers operating on the same principle, and performing the same functions by analogous means or equivalent combinations, even though the infringing machine may be an improvement of the original, and patentable as such. But if the invention claimed be itself but an improvement on a known machine by a mere change of form or combination of parts, the patentee cannot treat another as an infringer who has improved the original machine by use of a different form or combination performing the same functions. The inventor of the first improvement cannot invoke the doctrine of equivalents to suppress all other improvements which are not mere colorable evasions of the first."

Following this statement of the principle to be applied the court pointed out that dividers performing the same function as McCormick's were known prior to his invention so that he had the standing only of an improver of an old art, and the judgment of the lower court for the defendants was affirmed.

In *Burr* v. *Duryee,* 1 Wall., 531 (1863) the court, in the course of the opinion, on page 573, quoted with approval the last two sentences of the extract copied above from *McCormick* v. *Talcott.*

Burden v. *Corning,* 2 Fish. Pat. Cas., 477; s. c. 4 Fed. Cas. No. 2143. (1864).

The suit was for infringement of a patent for a machine for making horse shoes. In the opinion of the court seven patents in England and the United States for machines accomplishing the same result are referred to. One of these was a U. S. patent to Young and Titus. The defendants claimed that the machines made by them were substantially like the Young and Titus machine with some modifications. Speaking of the rights of subsequent improvers of Young and Titus, the Court said on page 707 of the report in 4 Fed. Cases:

> "The patentee of the first of such inventions could not treat another as an infringer, because he had improved the machine of Young and Titus, or that of any other prior inventor, by the use of a substantially different device, or a substantially different combination of parts, though such device or combination were capable of performing the same functions. In such cases, the inventor of the first improvement can not invoke the doctrine of equivalents to suppress other improvements which are not mere colorable evasions of the first: *McCormick* v. *Talcott,* 20 How. (61 U. S.) 402, 405."

Hill v. *Sawyer,* 31 Fed. 282. (1887).

The patent was for an improvement in dating stamps. The question was a close one. The decision was by Judge Coxe in 1887. He has grown to be a great judge since then. In the opening of his opinion he said on page 284:

> "Do the defendants infringe? This question is a perplexing one, and the solution of it is surrounded by unusual difficulties. An examination of the authorities in analogous cases, however, has confirmed and strength-

> ened the impression formed at the argument that the defendants do not infringe. The construction placed upon the claim, in view of the restricted theater of operation, must necessarily be a narrow one."

His final conclusion was in these words, on page 285:

> "Nevertheless the defendants' rolls are not the rolls of the patent, and, although they produce similar results, they cannot be regarded as equivalents. This case, it is thought, belongs to that class of inventions where the doctrine of equivalents cannot be invoked to suppress improvements on a well known machine. Where change of form or combination only is involved, each inventor must be content with the structure described and claimed by him. *McCormick* v. *Talcott,* 20 How. 402."

Bragg et al. v. *Fitch,* 121 U. S. 478. (1887).

The patent in suit was for an improvement in harness hooks or snaps. After showing that devices of that kind were old and had been made in many forms, the court said, on page 830:

> "It is obvious from the foregoing review of prior patents that the invention of Bristol, if his snaphook contains a patentable invention, is but one in a series of improvements all having the same general object and purpose, and that in construing the claims of his patent they must be restricted to the precise form and arrangement of parts described in his specification, and to the purpose indicated therein."

Parry Mfg. Co. v. *Hitchcock Mfg. Co.,* 58 Fed. 402. (1893).

Suit for infringement of a patent for improvements in sulky road wagons. The court said on page 403:

> "The field of invention is exceedingly narrow. For centuries improvements in vehicles drawn by animals have been going on in both hemispheres. It is manifest that a broad invention in this art is well nigh impossible. Improvements may be made from time to time, but patents therefor must be strictly construed and the claims limited to the precise advances made by the inventor. *McCormick* v. *Talcott,* 20 How., 402."

In *Whitmun* v. *Seaman et al.,* 4 Fed., 436, the suit was on a patent for improvement in coal scuttles. The court said, on pages 436-7:

> "As the orator is not the inventor of coal-scuttles, nor of anything underlying the whole structure, his patent cannot be construed as covering the whole, but must be restricted to the particular construction invented by him in order to stand at all. *Railway Co.* v. *Sayles,* 97 U. S., 554."

In *McMurry et al.* v. *Mallory & Co.,* 5 Fed., 593, the suit was on two patents for improvements in soldering irons. It was an old art and many forms of soldering irons had been made. The court said in the opinion, on page 598:

> "The conclusion to which I have come is that the two patents on which the complainants base their claims are for combinations in which the *form* of the instrument is of the essence of the invention, and that the complainants are entitled only to substantially that *form* of instrument which, in his specifications and drawings, the patentee under whom they

claim has shown. *Railway Co.* v. *Sayles,* 97 U. S. 556."

The bill was dismissed.

In *Falls Rivet Co.* v. *Wolfe et al.,* 40 Fed., 465, decision by Judges MCKENNAN and ACHESON, the case was a suit for infringement of a patent for improvement in friction clutches. The device was a very old one. The court expresses the opinion on page 466 of the report that probably 300 patents had been granted on such devices. In the conclusion of the opinion the court said, on page 470:

> "Finally, it is very clear that Brock's invention is not of a primary character. He was a mere improver of an old device. This field of invention had been thoroughly worked over before Brock entered it. At the most he took but a single step forward. Treating him, then, as an inventor, the case, we think, fairly comes within the principle stated in *Railway Co.* v. *Sayles,* 97 U. S., 554, 556, 557; 'but if the advance towards the thing desired is gradual, and proceeds step by step, so that no one can claim the complete whole, then each is entitled only to the specific form of device which he produces, and every other inventor is entitled to his own specific form, so long as it differs from those of his competitors, and does not include theirs.' "

The bill was dismissed.

In *Ginna* v. *Mersereau Mfg. Co.,* 69 Fed., 344, the suit was for infringement of a patent for improvement in machines for the manufacture of tin cans. The decision was rendered by Judge ACHESON. The art was an old one. After pointing that out, the court said, on page 346:

> "The relation of Hipperling to the art of double seaming cans of rectangular shape was that of an improver only, and therefore he must be confined to his own form of construction. *Railway Co.* v. *Sayles,* 97 U. S. 554."

The bill was dismissed.

Union Writing Mach. Co. v. *Domestic Sewing Mach. Co.,* 95 Fed., 140, was on a patent for improvements in typewriting machines. The court said, on page 144:

> "Upon a thorough examination of the proofs, I am entirely satisfied that, in view of the state of the art at the time of the invention in question, the plaintiff's case falls within that class of patents in which the inventor is to be limited to his own precise devices and held rigidly to his claims. *Railway Co.,* v. *Sayles,* 97 U. S., 554."

The bill was dismissed.

In the very recent case of *Johnson* v. *Johnson,* 190 Fed., 20, (1911), the suit was for alleged infringement of patent to the plaintiff for improvement in tennis court markers. The defendant had a patent also, two years later in date, for apparatus for the same purpose. After pointing out that other devices for the same use had been patented, both in this country and in England, long before, so that both the Johnsons were improvers only, the court stated the rule of law applicable to the case as follows, on page 25 of the report:

> "The law is well settled that where the patents sued on are not pioneer patents, and do not embody a primary invention, but are only improvements on the prior art, and de-

> fendant's machines can be differentiated, the charge of infringement cannot be maintained."

This is a remarkable series of cases. It reaches from 1857 to 1911. Like links in a chain they follow one another from the first to the last. What is their meaning? They have a deep one for this case. To find it will involve a little study of the foundation and development of our patent system.

Section 8 of Article I of the Constitution of the United States provides that Congress shall have power "to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

It is to be noted that the thing to which patentees are to have exclusive rights is *their discoveries.*

The statutes which give effect to this provision are as follows:

Section 4884, R. S., is in these words:

> "Every patent shall contain a short title or description of the invention or discovery correctly indicating its nature and design, and a grant to the patentee, his heirs or assigns for the term of seventeen years, of the exclusive right to make, use, and vend the invention or discovery throughout the United States and the territories thereof, referring to the specification for the particulars thereof. A copy of the specification and drawing shall be annexed to the patent and be a part thereof."

The right conferred is to make, use and vend the *invention or discovery.*

Section 4888, R. S., is in these words:

> "Before any inventor or discoverer shall receive a patent for his invention or discovery, he shall make application therefor in writing to the Commissioner of Patents, and shall file in the Patent Office a written description of the same, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains or with which it is most nearly connected, to make, construct, compound and use the same; and in case of a machine, he shall explain the principle, thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions; and he shall particularly point out and distinctly claim, the part, improvement, or combination which he claims as his invention or discovery. The specification and claim shall be signed by the inventor and attested by two witnesses.

This requires the inventor to *describe his invention* minutely.

Section 4893, R. S., is in these words:

> "On the filing of any such application and the payment of the fees required by law, the Commissioner of Patents shall cause an examination to be made of the alleged new invention or discovery; and if on such examination it shall appear that the claimant is justly entitled to a patent under the law and that the same is sufficiently useful and important, the Commissioner shall issue a patent therefor."

The issue of the patent is therefore a finding by the Commissioner that the invention described in the

patent is useful and important, or, as the phrase goes, "new and useful."

None of these provisions of the statute confers upon a patentee any exclusive right except to the *invention described in his specification.* Taken literally that would mean the very thing—the exact thing described in the specification. In every case of controversy about what the words of a specification are to be taken to mean, the question is one for judicial intervention. The courts must settle all such disputes. It has happened that the disputes have been innumerable and the decisions relating to them form a body of adjudications hardly second in number to that in any other department of jurisprudence, all designed to administer the patent law fairly between patentees and the public. It has followed out of this situation that the *decisions of the courts constitute the patent law of the United States.* When we want to know what that law is we must go there to find it.

It is one of the beneficent features of the evolution of bench made law that it tends to development of principles. Of these the most important one in the patent law resting on adjudication is that which establishes the distinction between pioneer inventions and improvement inventions. A pioneer invention is one in which, in the language of the Supreme Court, "one inventor precedes all the rest and strikes out something which includes and underlies all that they produce." After him the field is open to others to make improvements in the machine, or apparatus, or process covered by his invention. But all those improvements are in-

fringements of the pioneer, or primary patent. As the Supreme Court goes immediately on to say in the decision just quoted from, "he acquires a monopoly and subjects them to tribute."

Then comes the question: What are the rights of the improvers among themselves and as against one another? The Supreme Court again gives this answer: "Then each is entitled only to *the specific form of device which he produces, and every other inventor is entitled to his own specific form,* so long as it differs from those of his competitors and does not include theirs."

There is no end to refinements in the application of a rule of this kind. "Only to the specific form of device which he produces." Does that mean exactly what it says? Does it mean that the monopoly of an improvement patent is limited to the very identical thing described in it? The answer to this question is to be found in the collation and comparison of decisions relating to improvement patents, such as we have made in the chain of cases cited in the preceding pages.

Some of these cases limit the monopoly of improvement patents to the exact invention described in the specification. One says that the claim of the patent must be restricted to the "precise form" described in the specification; another that the charge of infringement cannot be maintained if the defendant's machine can be "differentiated;" another that the patent must be limited "to the specific combination" described in it, and so on. How shall we present these cases in such way as to express as nearly as possible the full

force of all of them in the fewest possible words' We know of no way to do it except by a sort of conspectus which shall give in the words of the judge delivering the opinion his own final statement of the point of the decision. That will be authoritative, and we can make it concise. We have, therefore, compiled the following:

CONSPECTUS OF THE DECISIONS

RAILWAY v. SAYLES AND CASES FOLLOWING IT.

Railway v. *Sayles,* 97 U. S., 554, 561. Railway Brakes.

> "They invented a particular apparatus for doing the desired work; and *they can only claim their particular apparatus, or that which is substantially the same.*"

Duff v. *Sterling Pump Co.,* 107 U. S., 636. Washboards.

> *"He merely devised a new form to accomplish these results. The defendant adopts another form."*

Strobridge v. *Smith W. W. Co.,* 46 Fed., 922, 924, Coffee-Mill.

> *"Entitled only to his own specific form of device."*

Adams E. Ry. Co. v. *Lindell Ry. Co.,* 77 Fed., 432, 448, Elec. Motor.

> *"The specific combination he described and claimed in his patent and to palpable evasions of it."*

Corser v. *Brattleboro O. Co.,* 93 Fed., 805, 806-7. Overalls.

> "The plaintiff could have a valid patent

only for his specific improvements upon them in these respects."

Diamond Rub. Co. v. *Consol, R. T. Co.,* 220 U. S., 428, 435. Rubber Tires.

"A step only in the march of improvement, *and limited, therefore, to its precise form and elements."*

Whitman v. *Seaman,* 4 Fed., 426-7. Coal-scuttles.

"Must be restricted to the *particular construction invented by him in order to stand at all."*

McMurry v. *Mallory & Co.,* 5 Fed., 593, 598. Soldering irons.

"Entitled only to substantially that *form of instrument which the patentee has shown."*

Falls Rivet Co. v. *Wolfe,* 40 Fed., 465, 470. Friction clutches.

"Brock was a mere improver of an old device: he took but a single step forward and *is entitled only to the specific form of device which he produced."*

Ginna v. *Mersersau,* 69 Fed., 344, 346. Machine for manufacture of tin cans.

"The relation of Hipperling to the art of double seaming cans of rectangular shape was that of an improver only, and therefore *he must be confined to his own form of construction."*

Union Writing Mach. Co. v. *Domestic Sewing Mach. Co.,* 95 Fed., 140, 144. Typewriting machines.

"In view of the state of the art at the time of the invention the inventor is to *be limited to his own precise devices, and held rigidly to his claims."*

McCormick v. Talcott, 20 *How.,* 402, 404-5. Reaper Divider.

> "The inventor of the first improvement cannot invoke the doctrine of equivalents to suppress all other improvements *which are not mere colorable evasions of the first.*"

Burden v. *Corning,* 4 Fed. Cas., No. 2143. Horseshoe Machine.

> "In such cases the inventor of the first improvement can not invoke the doctrine of equivalents to suppress other improvements which are not *mere colorable evasions of the first.*"

Hill v. *Sawyer,* 31 Fed., 282, 285. Dating Stamps.

> "Where change of form or combination only is involved *each inventor must be content with the structure described and claimed by him.*"

Bragg v. *Fitch,* 121 U. S., 478, 483. Harness Hooks or Snaps.

> *"In construing the claims of his patent they must be restricted to the precise form and arrangement of parts described in his specification."*

Parry Mfg. Co. v. *Hitchcock Mfg. Co.,* 58 Fed. 402, 403. Sulky Road Wagon.

> "Improvements may be made from time to time, but patents therefor must be strictly construed, *and claims limited to the precise advances made by the inventor.*"

Johnson v. *Johnson,* 190 Fed., 20, 25. Tennis Court Marker.

> Where the patent "is only an improvement on the prior art and *defendant's machine can*

be differentiated the charge of infringement can not be maintained."

The problem now is to give such effect to these authorities as they ought to have in this case. They cannot be ignored. As we have pointed out, the decisions of the courts are the sole repository of the patent law in its practical administration. The statute furnishes only the bare skeleton. The growth of the patent law in this country has had a striking similarity to the growth, on a longer and larger scale, of the common law of England. It has been built up on one decision after another. The cases we have cited relate mostly to little things which have been the subject of many inventions, such as washboards; coffee mills; overalls; coal scuttles; soldering irons; friction clutches dating stamps and harness hooks. But, of course, a large machine may have patented improvements in small features. In the above list is a machine for making tin cans; a type writing machine, and one for making horse shoes, to all which the same principle applies. If a patentee should come into this court as a suitor on a patent for a suspender buckle and it should appear that suspender buckles had been the subject of many prior patents, would not the court follow these authorities and hold him down close to his own construction?

What sort of inventions are concentrating tables? Do these cases apply to them? An answer will require a little study of the field. We ought to know something of the number and variety of ore concentrators and ore concentrator patents. As to the number of patents no

man can tell. There is no such class as ore concentrators apart from "Washers" in the classification of the Patent Office. We know there are a great many of them—many hundreds, doubtless, and more coming. The most useful help we can render the court on this point by anything we can put in a brief will be to insert here illustrations of some of them. We will make it eighteen because we happen to have that many cuts within our reach. They may be taken as samples of the whole. They show for themselves what they are. Each one is a zincograph of a patent drawing. Some of the patents are in the record, and some are not. But that does not matter. They are not offered as anticipations of anything, but as mere illustrations of the general character of the field. On page 47 of the record there is a list of 15 patents referred to in the answer as prior to Wilfley; and on page 50 a supplementary list of 6 more in an amendment of the answer. All these were put in as evidence and a number of them are in the printed record from page 309 to 359. The following reproductions include some of them and some others.

(No Model.) 2 Sheets—Sheet 1.

A. BLATCHLY & G. KUSTEL.

ORE CONCENTRATOR.

No. 258,879. Patented June 6, 1882.

Fig. 1

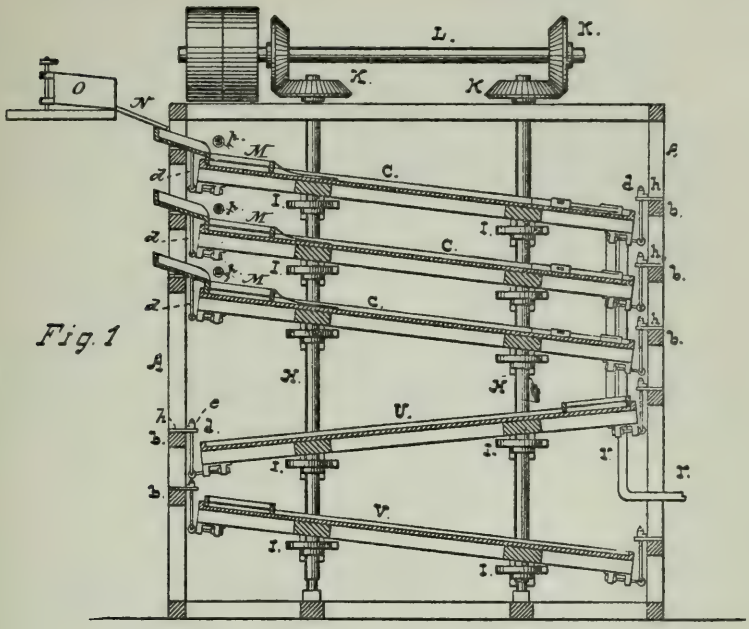
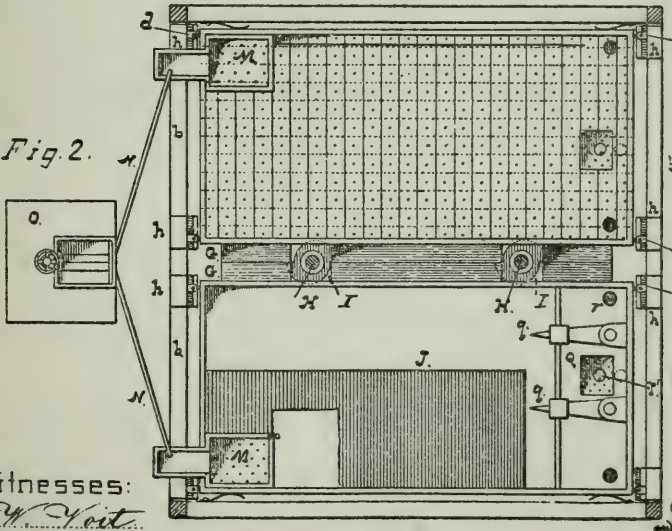


Fig. 2.



Witnesses:
W. Voit
E. W. Clark

Inventors
Ambrose Blatchly
and Guido Kustel
Pyne & Orkard
Their Attys.

(No Model.)

H. C. KRAUSE.

ORE SEPARATOR.

No. 349,504. Patented Sept. 21, 1886.

Fig. 1.

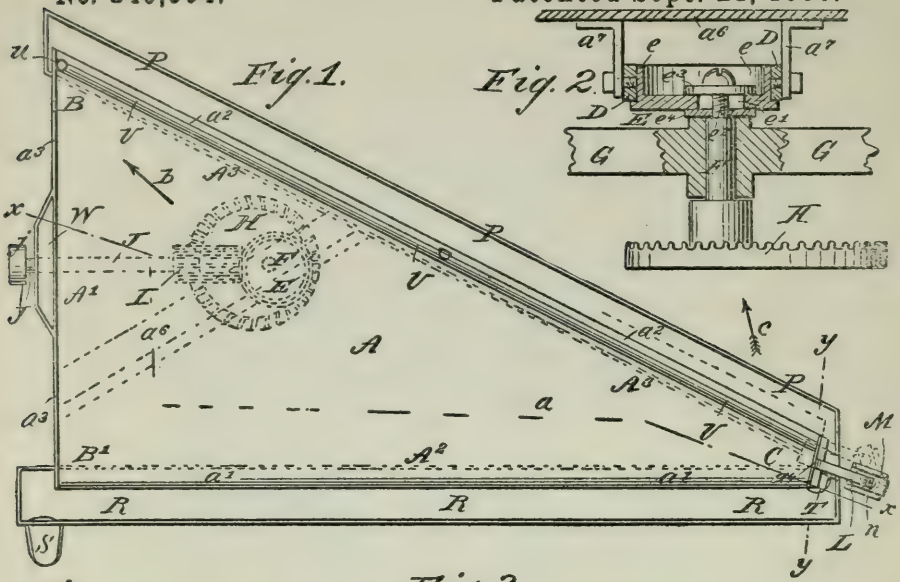


Fig. 2.

Fig. 3.

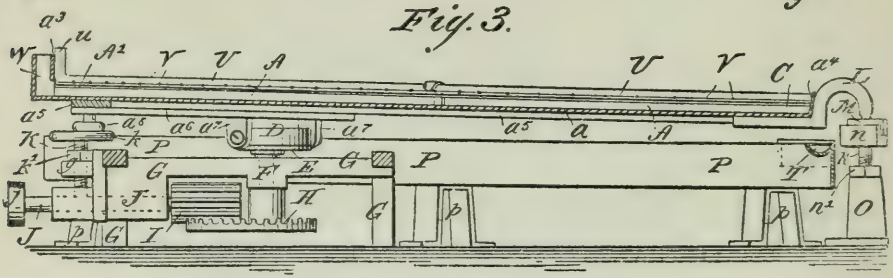


Fig. 4.

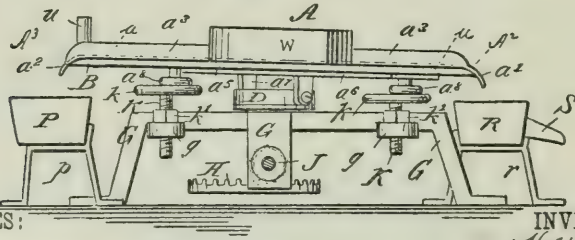
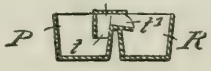


Fig. 5.



WITNESSES:

Donn Twitchell

C. Sedgwick

INVENTOR:

H. C. Krause

BY Munn & Co.

ATTORNEYS.

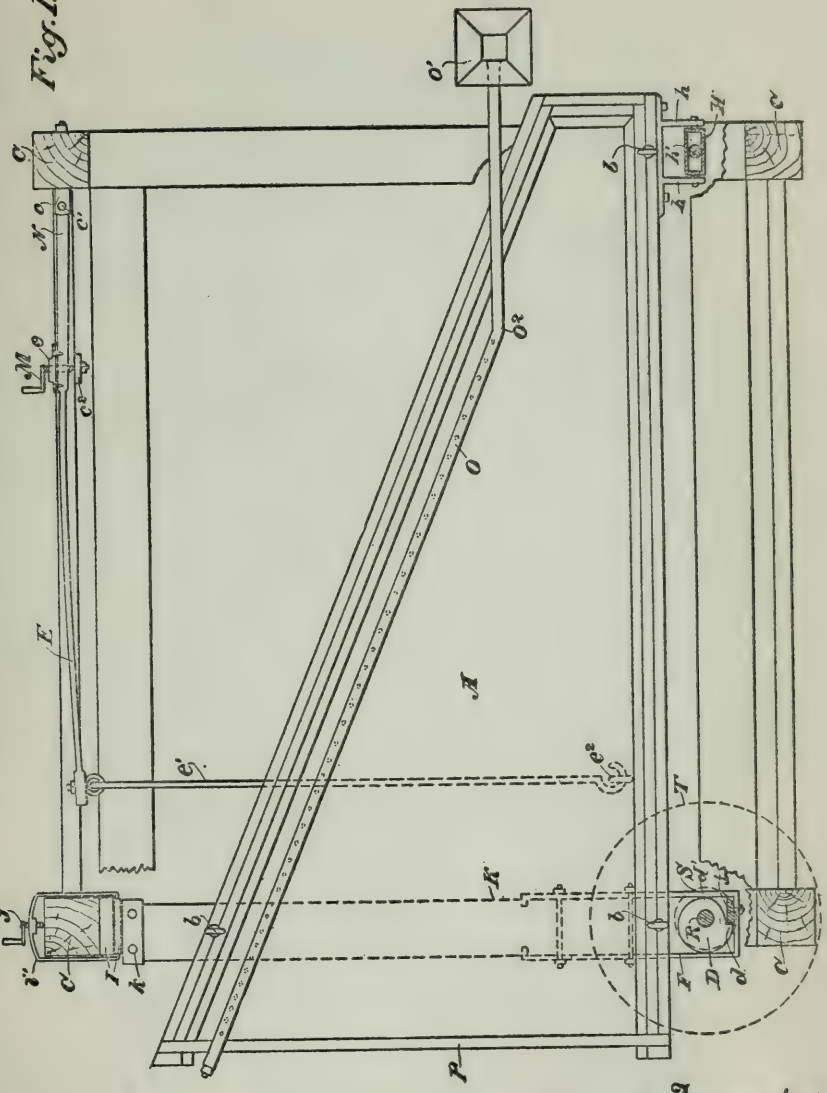
(No Model.) 2 Sheets—Sheet 1.

L. LOOK.

ORE CONCENTRATOR.

No. 526,242. Patented Sept. 18, 1894.

Fig. 1.



Witnesses.
J. L. Norris
H. F. Ascheck

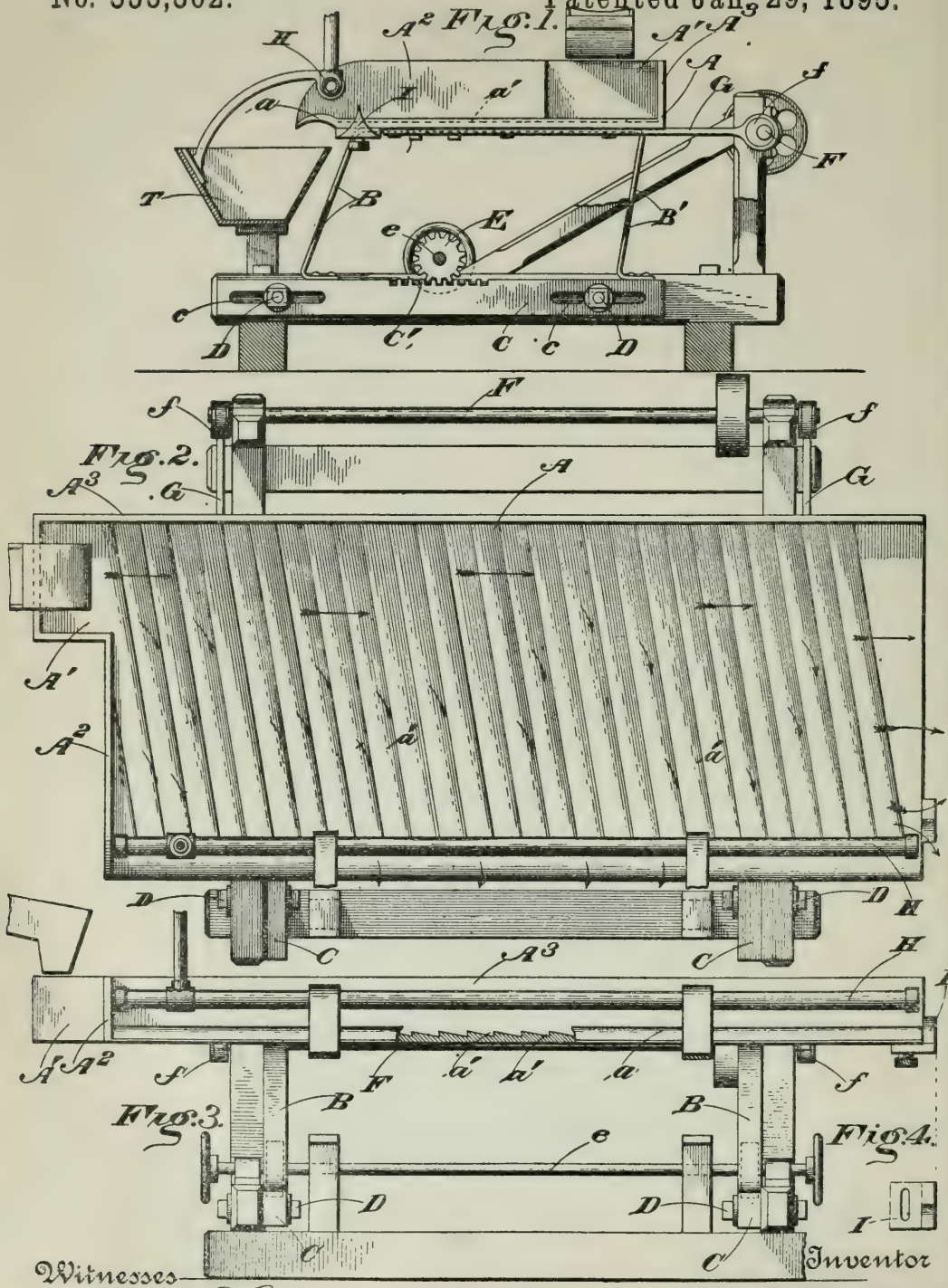
Inventor
Luther Look
By Dewey & Co.
Attys

(No Model.)

J. LAMPERT.

CONCENTRATOR.

No. 533,362. Patented Jan. 29, 1895.



Witnesses
M. Fowler.
James R. Mansfield

Inventor
Jacob Lampert
by Alexander & Dowell.
Attorneys

No. 641,977. Patented Jan. 23, 1900.

J. LAMPERT.

ORE CONCENTRATOR.

(Application filed Mar. 16, 1899.)

(No Model.) 4 Sheets—Sheet 1

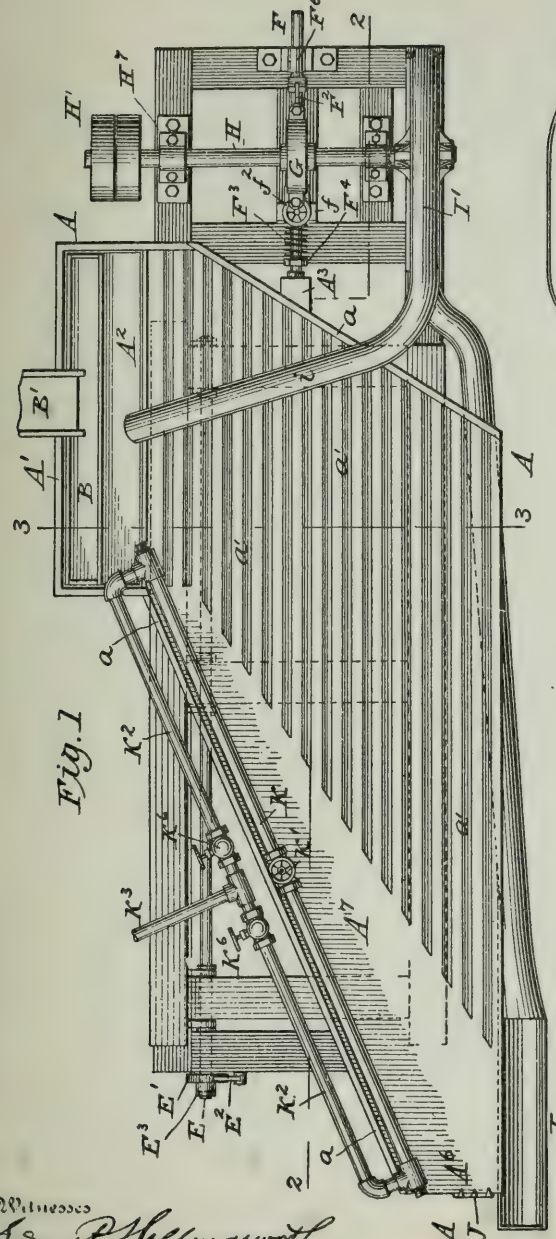


Fig. 1

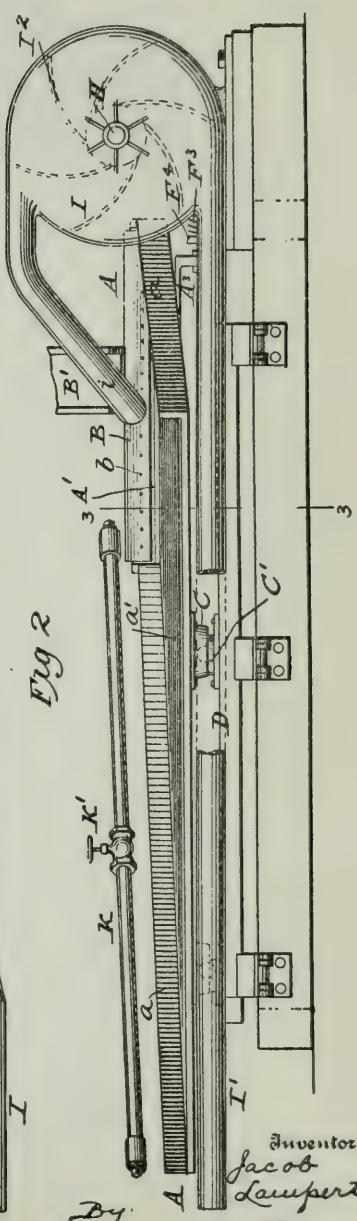


Fig 2

Witnesses
Sidney P. Hollingsworth
James R. Mansfield

Inventor
Jacob Lampert
By
Alexander & Dowell
Attorneys

No. 661,886.

Patented Nov. 13, 1900.

I. F. MONELL.

CONCENTRATING TABLE.

(Application filed June 9, 1899.)

(No Model.)

2 Sheets—Sheet 2.

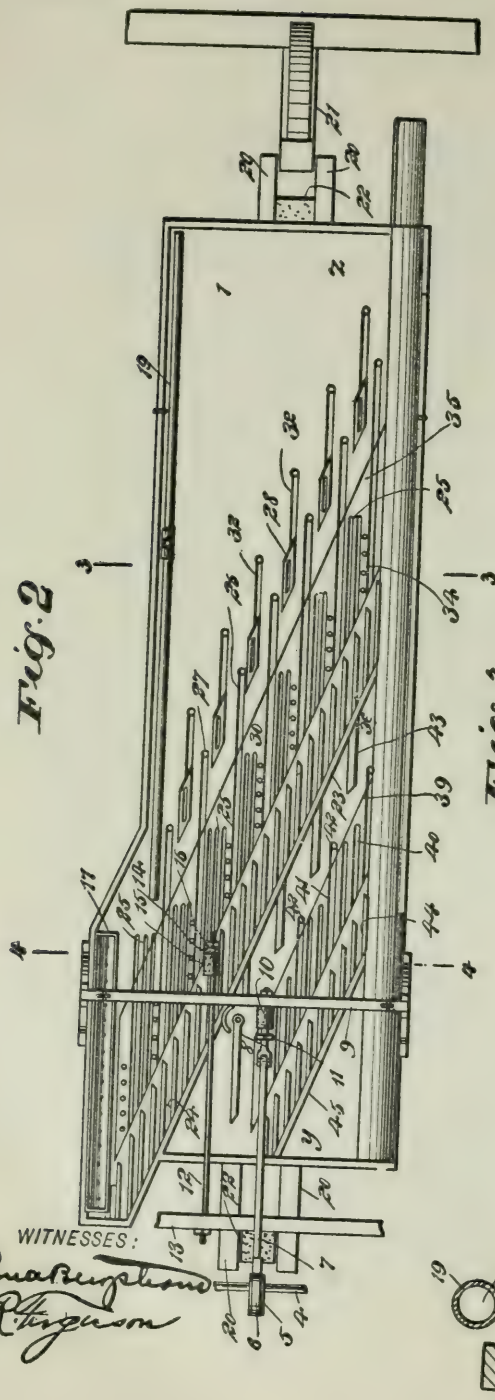


Fig. 2

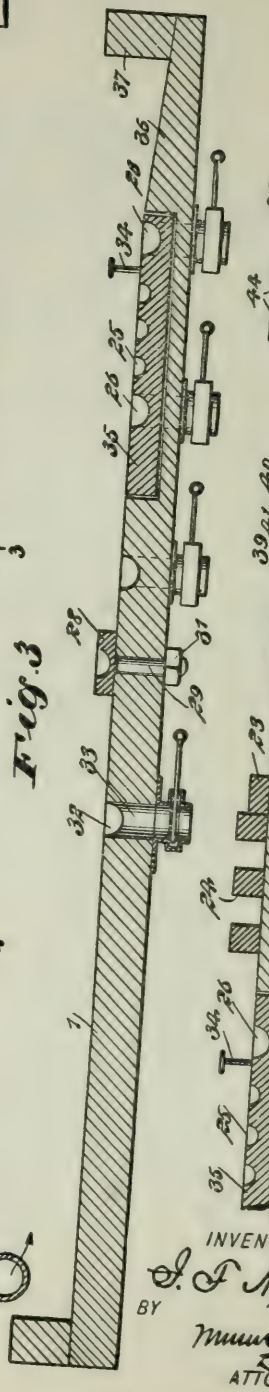


Fig. 3

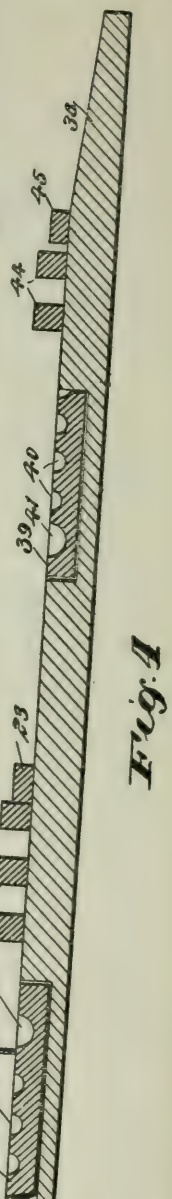


Fig. 4

WITNESSES:

Johna Bergland

R. Ferguson

INVENTOR

I. F. Monell

BY

Munn & Co.

ATTORNEYS

No. 682,371. Patented Sept. 10, 1901.

H. P. TAYLOR.

ORE CONCENTRATOR.

(Application filed Jan. 7, 1901.)

(No Model.) 2 Sheets—Sheet 1.

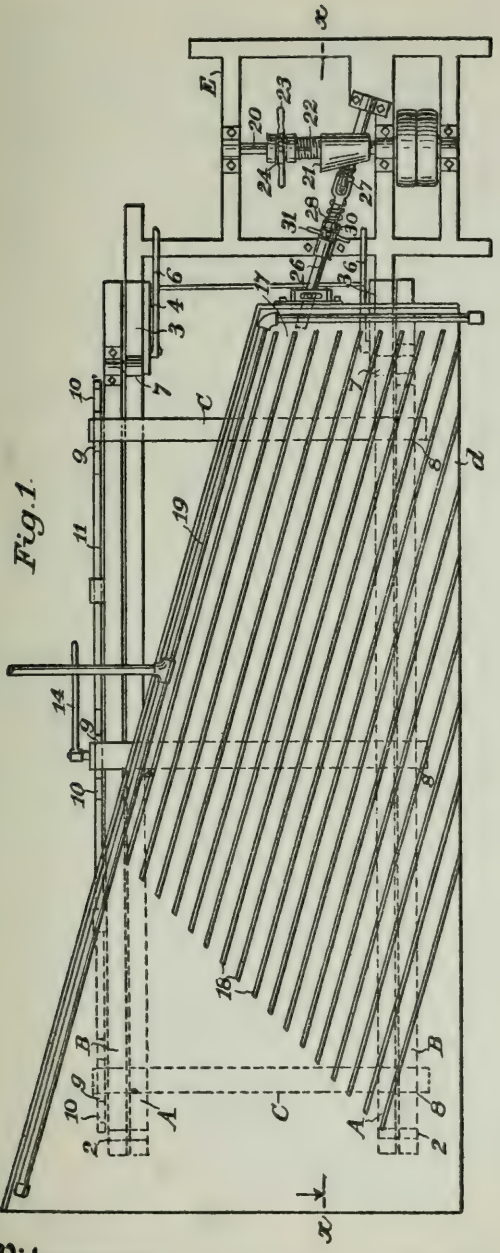


Fig. 1.

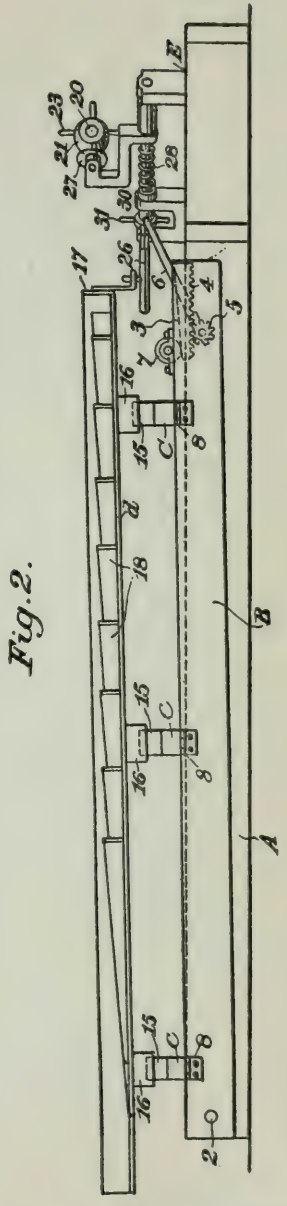


Fig. 2.

Witnesses,
E. A. Brandau,
J. L. Amrei

Inventor,
Harry P. Taylor
By Dewey Thompson & Co.
Attys

No. 687,908 Patented Dec. 3, 1901.

S. W. TRAYLOR.

CONCENTRATOR.

(Application filed Jan. 16, 1901.)

(No Model.) 2 Sheets—Sheet 1.

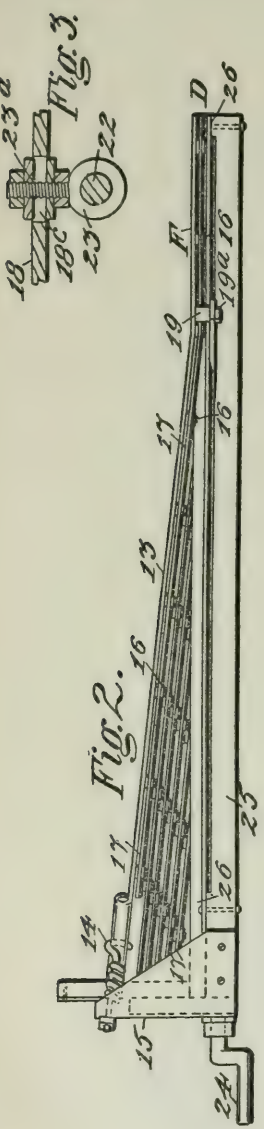


Fig. 2.

Fig. 3.

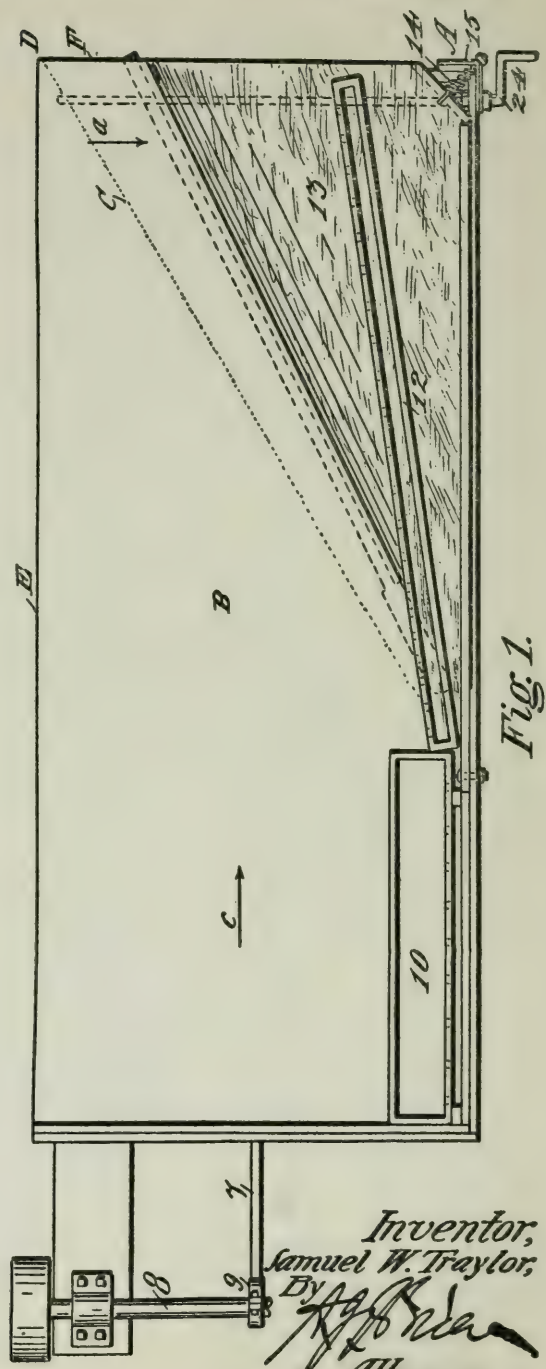


Fig. 1.

Witnesses,
H. M. Neff
Dora C. Shick

Inventor,
Samuel W. Traylor,
By
Attorney.

No. 660,342. Patented Oct. 23, 1900.

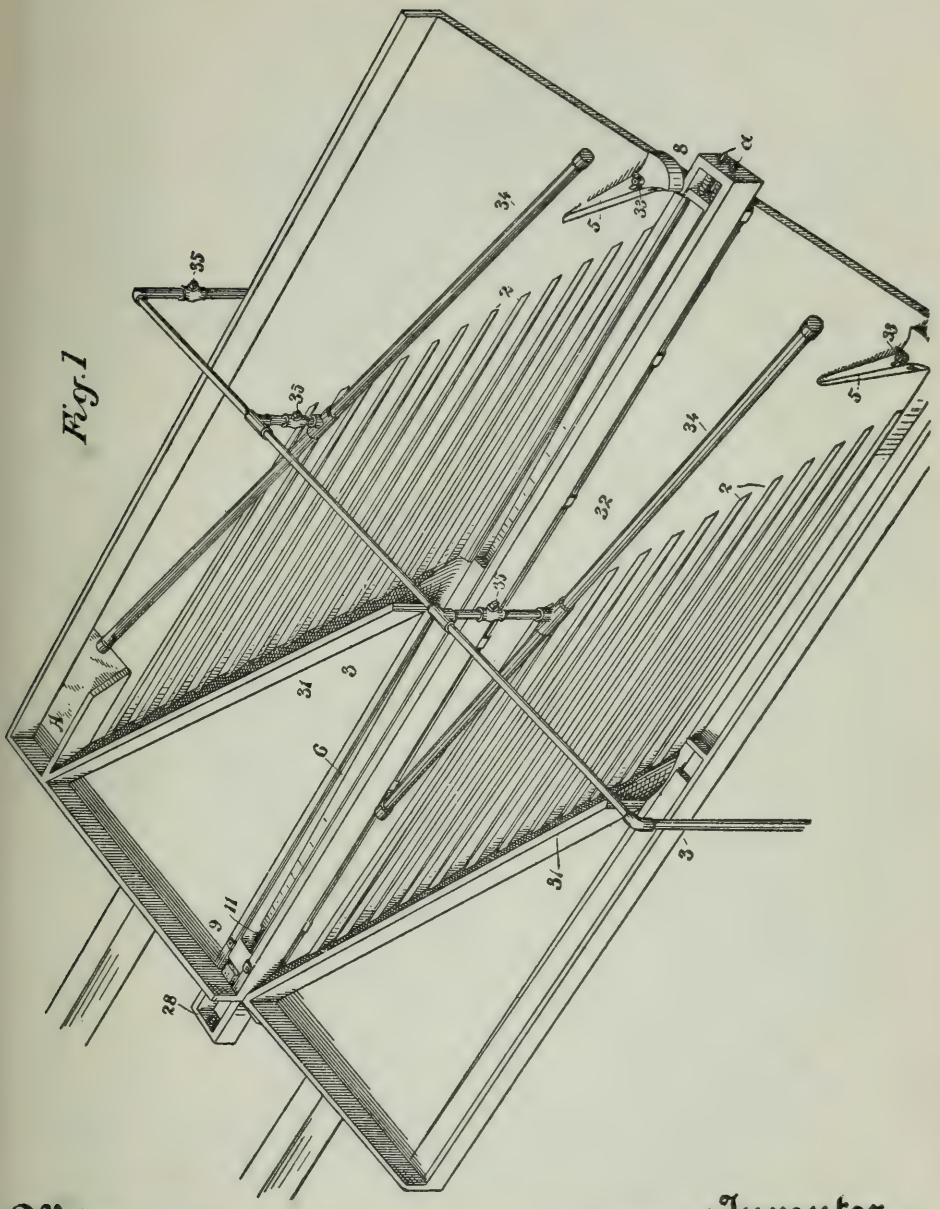
J. P. SMITH.

ORE SEPARATOR.

(Application filed Jan. 2, 1900.

(No Model.) 3 Sheets—Sheet 1.

Fig. 1



Witnesses,
J. F. Ashcheck

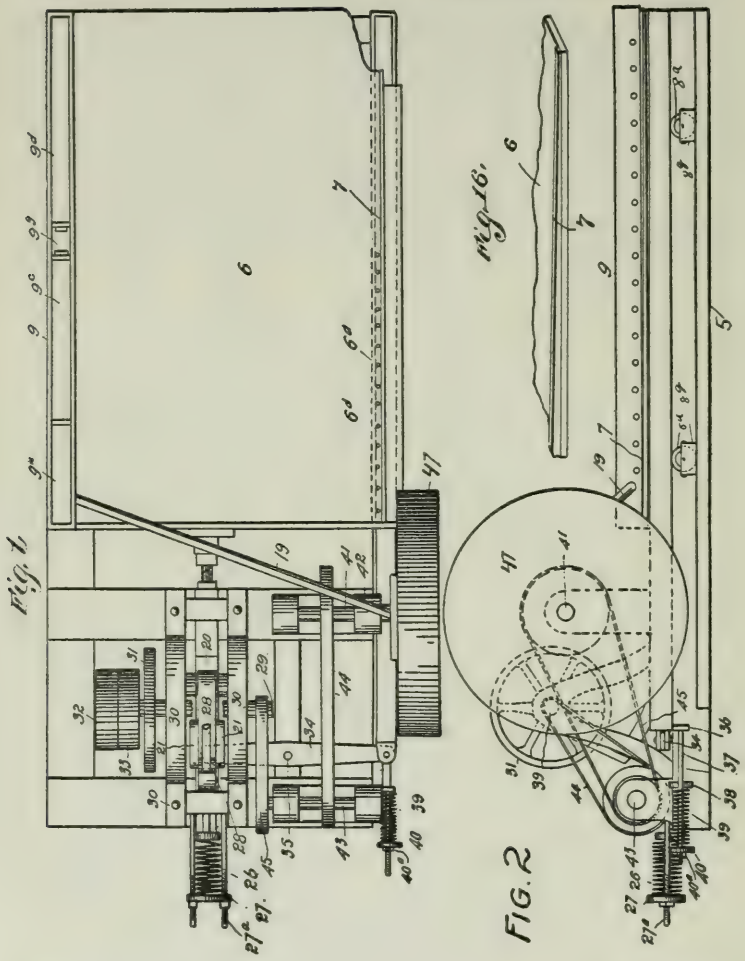
Inventor,
Jonathan P. Smith
by Dewey Strong & Co.
Attys

(No Model.) 4 Sheets—Sheet 1.

A. R. WILFLEY.

CONCENTRATOR.

No. 580,338. Patented Apr. 6, 1897



Witnesses
C. F. Clarke.
Edith Kinsworthy.

Inventor
A. R. Wilfley
By his Attorney
A. J. Wolcott

(No Model.) 2 Sheets—Sheet 2.

A. R. WILFLEY.

ORE CONCENTRATOR.

No. 590,675 Patented Sept. 28, 1897

FIG. 3.

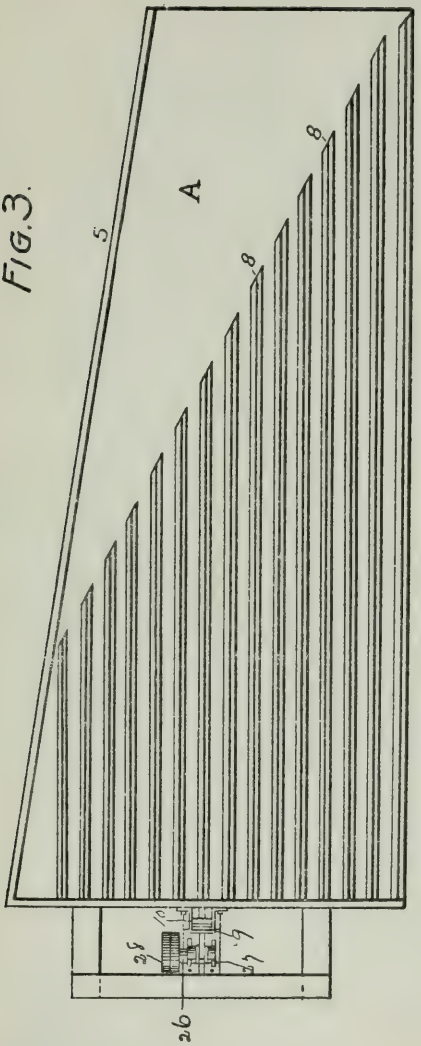
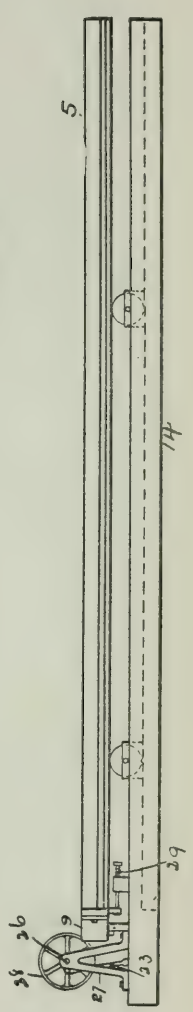


FIG. 4.



Witnesses
[illegible]
Edith Hinsworth

Inventor
A. R. Wilfley
By his Attorney [illegible]

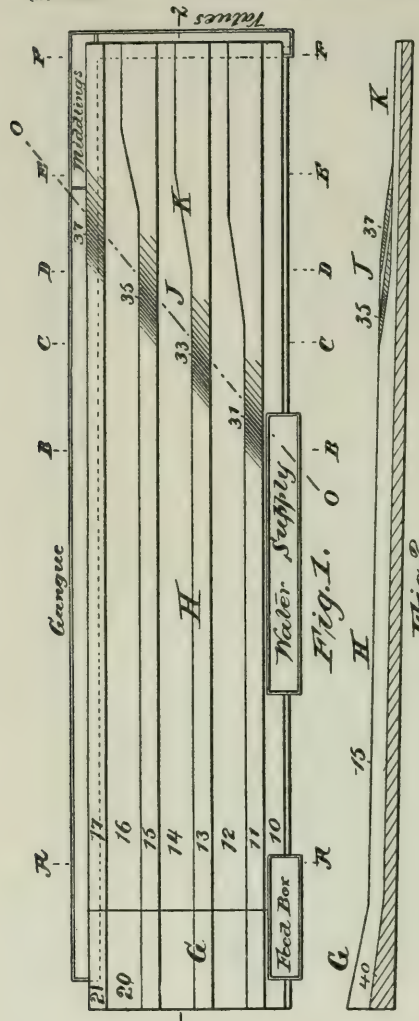
No. 632,892. Patented Sept. 12, 1899.

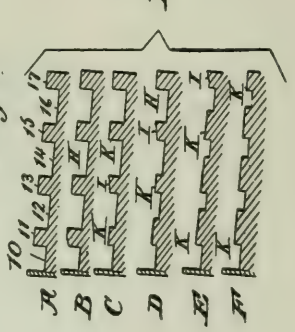
I. A. CAMMETT & F. E. SHEPARD.

ORE CONCENTRATOR.

(Application filed Oct. 12, 1898.)

(No Model.)





Witnesses,
C. W. Benjamin
Geo. H. Sonneborn.

Inventors,
Ira A. Cammett and Frank E. Shepard
By Ward & May
Attys

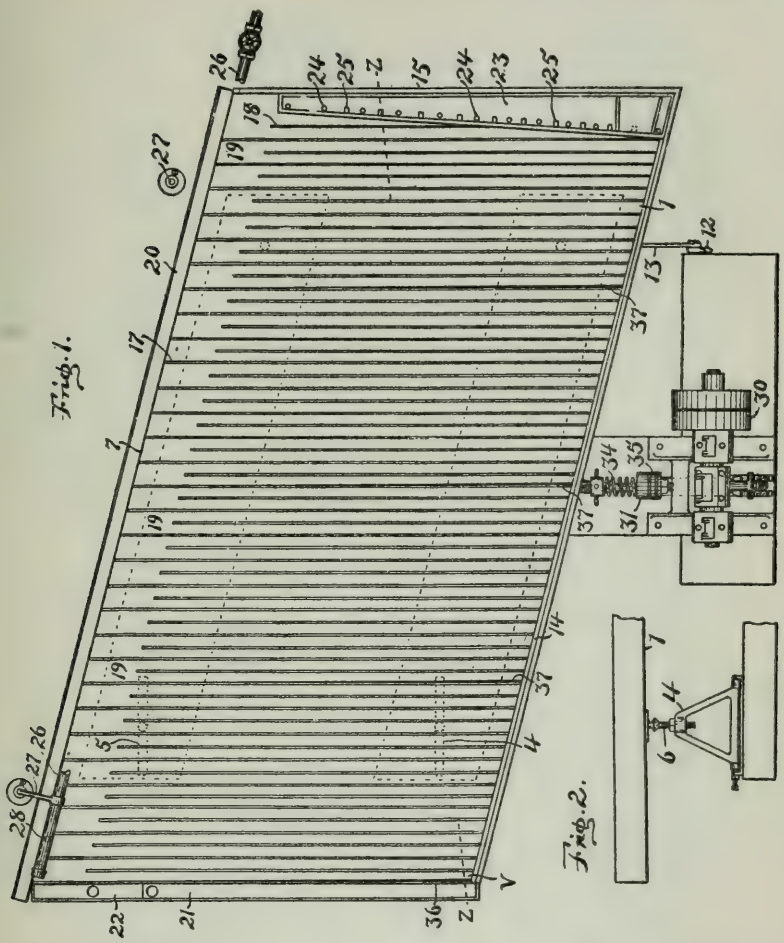
No. 895,107. PATENTED AUG. 4, 1908.

E. DEISTER.

ORE CONCENTRATOR.

APPLICATION FILED FEB. 19, 1906.

3 SHEETS—SHEET 1.



WITNESSES:

M. Mattler

William N Brueman

Emil Deister INVENTOR

BY A. G. Burns

ATTORNEY

E. DEISTER.

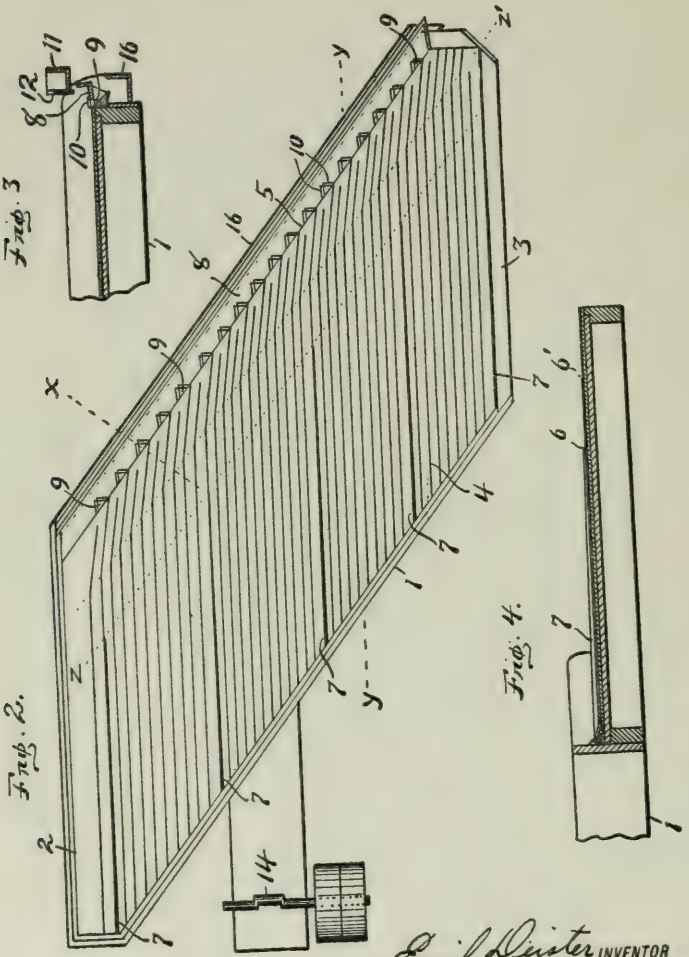
ORE CONCENTRATOR.

APPLICATION FILED JAN. 27, 1908.

1,044,030.

Patented Nov. 12, 1912.

2 SHEETS—SHEET 1.



WITNESSES:

Wm. N. Bruemmer

Mathilda Mettler

Emil Deister INVENTOR

BY A. G. Burnes

ATTORNEY

E. DEISTER.

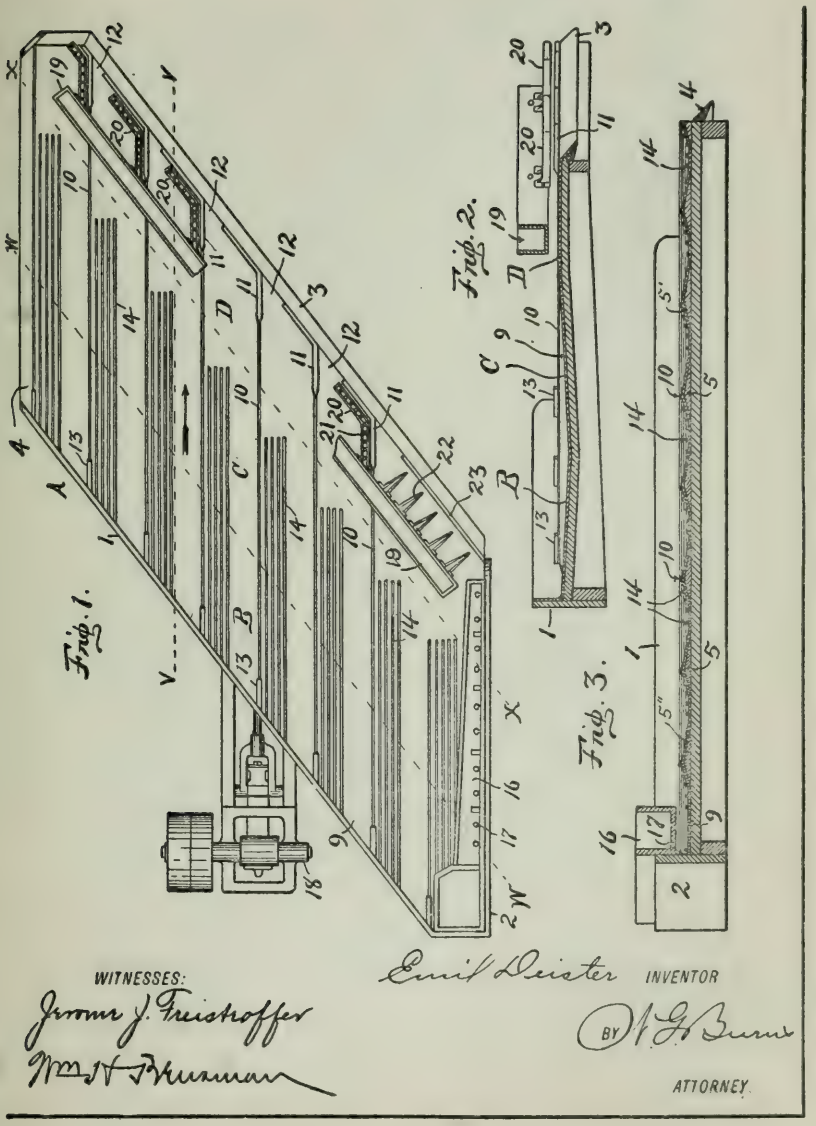
ORE CONCENTRATOR.

APPLICATION FILED AUG. 9, 1909.

1,019,884.

Patented Mar. 12, 1912.

3 SHEETS—SHEET 1.



No. 895,168. PATENTED AUG. 4, 1908.

E. DEISTER.

ORE CONCENTRATING TABLE.

APPLICATION FILED MAR. 3, 1906.

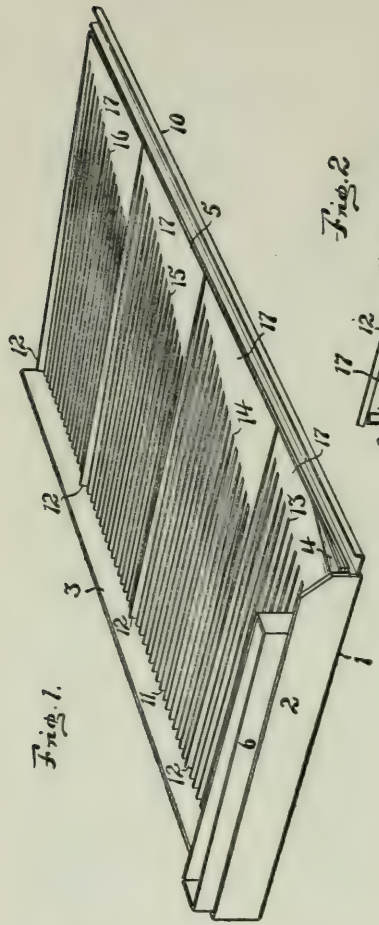


Fig. 1.

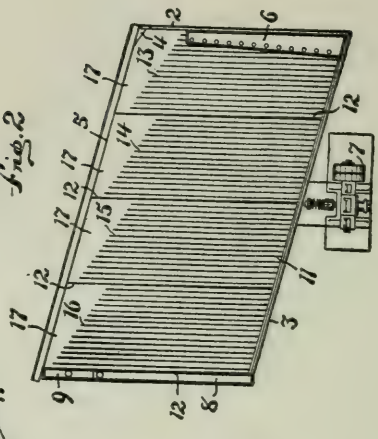


Fig. 2.

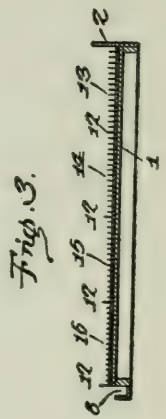


Fig. 3.

WITNESSES:

M. Mettler

William H. Bierman

Emil Deister INVENTOR

BY H. G. Burns

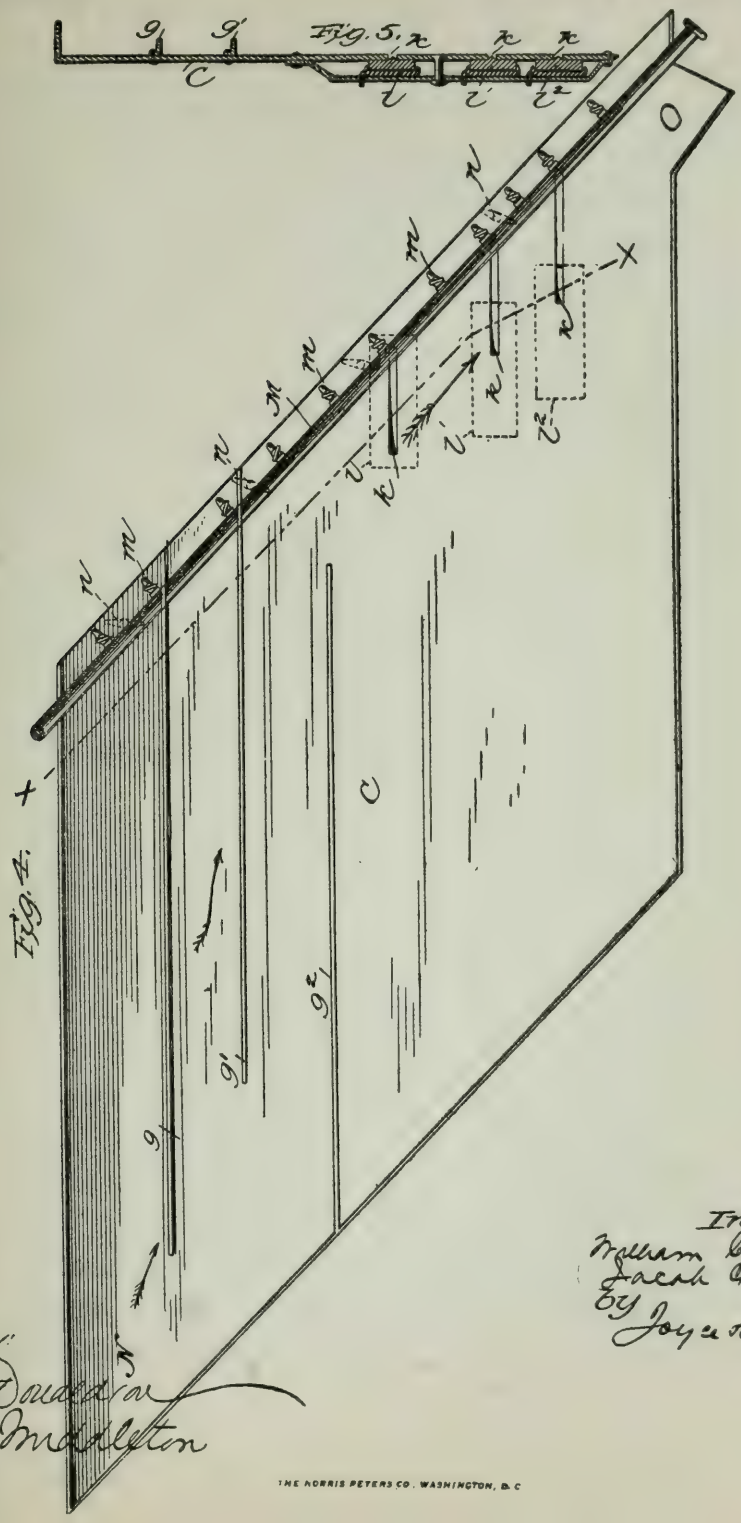
ATTORNEY

(No Model.) 4 Sheets—Sheet 4

J. CHERNEY & W. C. DAVIS.

ORE CONCENTRATOR.

No. 311,863. Patented Feb. 3, 1885.



Inventor
William C. Davis
Jacob Cherney
by Joyce & Lyon
Attys.

Attest:
Walter Dwight
F. L. Middleton

THE NORRIS PETERS CO., WASHINGTON, D. C.

All that all this amounts to is that the patents are numerous and are for improvement inventions differing only in the configurations of the surfaces of the table decks. The field is therefore one in which the great chain of cases to which we have referred has logical and controlling application. *It follows that the monopoly created by an ore concentrator patent is extremely narrow.* It is a field in which *form* is everything, and in which, as Mr. Justice BRADLEY puts it, *each inventor is entitled to his own specific form.*

And that is just. Here is a multitude of patents, each entitled to the presumption of validity which attends its issue. The inventions described in them differ only in minute particulars. Each patentee is entitled to a monopoly of his own invention. We can give every one of them his own invention *provided we give no one of them any more.* Is not that the only way to do even justice to them all?

This gives us the measure of Mr. Wilfley's right. *It is to substantially his own form.* That does not include the Deister table.

Counsel on the other side will not be able to deny the existence of this chain of authorities and will hardly dare question their binding force, but they will try hard to find some ground of exception to them in favor of the Wilfley table. They urged in the court below that it embodied a new principle and was therefore entitled to a liberal construction. So it does embody a new principle, in a sense, and had to in order to be patentable. Section 4888, R. S., which defines the terms on which patents may be granted, expressly

requires that "in case of a machine, he (the applicant) shall explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions." We suppose the word principle as here used means mode of operation, or the operation of the machine in those particulars in which it differs from other machines. In practice it works out in this way: The applicant or his solicitor describes, first, the separate parts of the machine with the aid of drawings, and then describes how the parts are put together and how they co-operate to produce the result. This description covers all the actions and inter-actions which take place in the working of the machine, and so distinguishes it from other machines of the same general character. In applying for his patent Mr. Wilfley pursued this course. He first described the separate parts of the machine with the aid of seven different drawings of parts. He then explained the assembling of the parts and the operation of the completed concentrator, and so complied with the statute. Ore concentrators are all alike in this particular. Each one of them embodies some principle or principles by which it is distinguished from all the others.

As a result of its combination of riffles of progressively increasing length with a single unriffled space adjoining their terminals the Wilfley table has a washing up process of its own, on the strength of which it was claimed that the table possessed a novel function which should entitle the patent to a broad construction. But the function was the same as the

principle—the washing up process along the diagonal line of riffle tips. But that is only one way of washing the sand out of concentrates. It is not the only way, nor the best way. Far back in this brief at pages 20 and 21 we described how the last residue of fine sand is washed out of the concentrates on the Deister table by the water flowing down from the washboard. In connection with that description, on page 23, we promised to prove later that the greater part of the concentrates produced by the Deister table come from the first group of riffles—those above the first high riffle. We will do that now. Among the proofs put in evidence by the defendant is an exhibit on file in this court showing a measurement of the output of concentrates recovered by the Deister table taken separately from different parts of the riffle terminals. We reproduce that exhibit here.

Mill Test-Series No. 32.

Sampling of Concentrates from Deister Table.

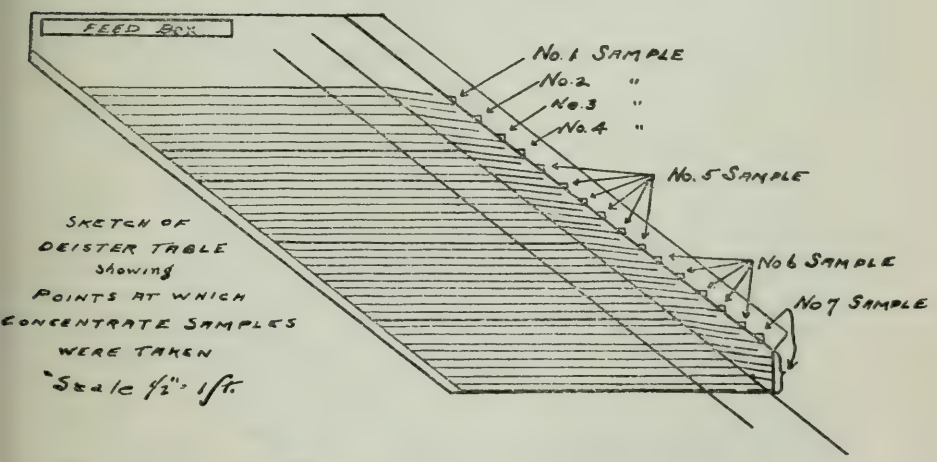
Mr. Norman Carmichael
Clifton, Arizona.

Dear Sir:-

The following figures on concentrates from one Deister Table were obtained at your request, in the presence of Mr. Deister and Mr. W.A. Moore. All the concentrates discharged for a period of 19 1/2 minutes, were caught, dried, weighed and sampled. The accompanying sketch shows the points at which the 7 separate samples were taken off the table. During the run it was noted that fine sand was being washed out of the concentrates over all the small inclined end riffles; the upper ones were conveying and cleaning concentrates for their entire length and the lower ones for only a portion of their length. Feed to table was coarse material dipped by paddle wheels from the slime overflow of Hancock jigs.

Results of Run.

Sample Number	Net dry Weight	% Copper	Lbs. Copper	% of total Copper	% Insol.
1	7# - 3 ozs.	18.24	1.3111	19.0	16.60
2	10 2	21.36	2.1627	31.4	8.80
3	8 13	23.14	1.5765	22.8	7.20
4	3 13	10.00	.6863	9.9	23.05
5	2 13 1/2	21.52	.6120	8.9	13.95
6	1 2	16.98	.1910	2.8	37.10
7	3 6 1/2	10.48	.3569	5.2	58.40
Totals	35 3	19.53	6.8965	100.0	



A careful study of this test will disclose some interesting facts. In the column of net dry weight of concentrates it appears that samples Nos. 1, 2, 3 and 4 weighed 28 pounds 7 ounces, while the total of all the samples was 35 pounds 3 ounces. Four-fifths of the concentrates came from the first division of the table, above the first high riffle. That means that four-fifths of the output of the table was safe in the concentrates box when the pulp had crossed less than half the length of the table. In pounds of assayed copper the same riffles yielded 5.73 pounds against a total of 6.89 pounds. The explanation is that at its first entrance upon the table the pulp contains its largest percentage of mineral and that in the form of its largest, heaviest particles. Were we not right in claiming, as we did, that the Deister table represents a great advance in the art over the Wilfley?

We submit that the Deister way of final washing up is not only different from the Wilfley way, but is a better way. The sum of it is that the Wilfley table is just what an inspection of Fig. 3 of the patent shows it to be—a machine having strong points of excellence, but with narrow limitations. Its plane, solid surface, its group of riffles of progressively increasing length, and its unriffled space adjoining their terminals form a combination of elements which are manifest on the face of the table. The attempts to evade the limitations of the claims of the patent upon the ground of some principle or function residing in the table had no foundation except in the imaginations of the experts. But their baseless theories so impressed the judge

of the District Court that he took it for granted that there must be some foundation for them, and without having any idea of what that was, he knowingly disregarded the plain language of the claims to meet, as he thought, some great equity in favor of the plaintiff.

The great chain of cases which we have cited cover a period in the history of the country cotemporaneous with the period of the issue of almost the entire body of patents in this country—1857 to 1911. In 1857 the total number of patents in existence was, in round numbers, 20,000; in 1911, 1,000,000. Those cases apply with more directness and force to ore concentrators than to the subjects of the adjudications themselves; more than to typewriters; washboards; coffee-mills; tin can machines; friction clutches or coal scuttles. *They embody the law. They apply to every ore concentrator patent in existence. They limit its monopoly to the invention described in it or mere evasions thereof.* The judgment of the District Court was a crime (an innocent one) against the law.

THE WESTINGHOUSE CASE

A situation sometimes arises in an advancing art in which the claims of an earlier patent, literally construed, will include, or may be claimed to include, the mechanism of a later patent which ought not in justice to be subject to its monoply. That situation is presented here. We do not admit that the Deister table is covered by the letter of the claims of the Wilfley patent, and we believe we have shown good reas-

ons why it is not. But counsel for the appellee will argue that it is, and we ought not to leave our client exposed to the least danger of that injustice, if we can avoid it. There is a line of cases which apply to just such a situation, and we feel it to be our duty to call the attention of the court to them.

The leading case in this line is *Westinghouse* v. *Boyden Power Brake Co.*, 170 U. S., 537.

This was a suit for infringement of claims 1, 2 and 4 of patent 360,070 to George Westinghouse, March 29, 1887, for improvement in air brakes. It was heard originally by the Circuit Court for the District of Maryland, which found for the defendant. 66 Fed., 997. Appeal was taken to the Circuit Court of Appeals for the Fourth Circuit, where the judgment of the District Court was affirmed as to claims 1 and 4, and reversed as to claim 2. 70 Fed., 816. From this judgment both parties applied for a writ of *certiorari* to the Supreme Court, which was granted.

The case is a great one. It deals with many questions. The inventions involved related to an art second to none in its importance to mankind—the control of railway trains. It was conceded that Mr. Westinghouse was the pioneer in air brakes. As such the court, on page 562, rank him with Howe of the sewing machine, Morse of the electric telegraph, and Bell of the telephone. But his pioneer patent had expired. He had taken out numerous patents for improvements, as also had a competitor, Geo. A. Boyden, who had made what the court regarded as a highly meritorious improvement. Comparing the

Westinghouse and Boyden improvements, the court said this on page 572-3 of the report:

> "The underlying distinction between the two devices is that in one, a separate valve and separate by-passage are provided for the train-pipe air, while in the other, the patentee has taken the old triple (or quadruple) valve, and by a slight change in the functions of two of its valves and the incorporation of a new element, (partition 9,) has made a more perfect brake than the one described in the Westinghouse patent. If the credit be due to Mr. Westinghouse for having invented the function, Mr. Boyden has certainly exhibited great ingenuity in the discovery of a new and more perfect method of performing such function. If his patent be compared with the later Westinghouse patent No. 376,837, which appears to have been the first completely successful one, the difference between the two, both in form and principle, becomes still more apparent, and the greater simplicity of the Boyden patent certainly entitles it to a favorable consideration. * * * * Under such circumstances, the law entitles him to the rights of an independent inventor."

The principle which we wish to apply here, and for the sake of which we cite the case, is stated thus on page 568:

> "But even if it be conceded that the Boyden device corresponds with the letter of the Westinghouse claims, that does not settle conclusively the question of infringement. We have repeatedly held that a charge of infringement is sometimes made out, though the letter of the claims be avoided. *Machine Co.* v. *Murphy,* 97 U. S., 120; *Ives* v. *Hamilton,* 92 U. S., 426, 431; *Morey* v. *Lockwood,* 8 Wall; 230; *Elizabeth* v. *Pavement Company,*

> 97 U. S., 126, 137; *Sessions* v. *Romadka,* 145 U. S., 29; *Hoyt* v. *Horne,* 145 U. S., 302. The converse is equally true. The patentee may bring the defendant within the letter of his claims, but if the latter has *so far changed the principle of the device* that the claims of the patent, literally construed, have ceased to represent his *actual invention,* he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent."

This decision has been followed by others to the same effect since, to some of which we beg leave to refer.

Norton v. *Wheaton,* 97 Fed., 636, was a suit on a patent for improvements in can-ending machines. The court said, on page 641:

> "In *Westinghouse* v. *Brake Co.,* 170 U. S. 537,568, the supreme court had before it the question of infringement involved in the mechanism for opening and closing certain valves in automatic air brakes. It was contended on the part of the complainant in that case that he was a pioneer inventor, and that the alleged infringing device corresponded to the very letter of the claims of the complainant's patent; but it was held that even this fact was not sufficient to establish infringement. The court said:
>
> 'The patentee may bring the defendant within the letter of his claims, but, if the latter has so far changed the principles of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who has violated

> the letter of a statute has to be convicted when he has done nothing in confiict with its spirit and intent.'"

Standard Computing Scale Co. v. *Computing Scale Co.,* 126 Fed., 639, (C. C. A., Sixth Circuit) was a suit for infringement of a number of patents for improvements in "weighing and price scales." The following is from the opinion, page 649:

> "Unless we attribute to the Culmer patent a scope so wide as to include all means of affecting flexibility between the beams, the applicant does not infringe, for it would be difficult to conceive things more unlike. It may be true that the appellant's structure would meet in a general way the calls of the first claim of the Culmer patent; but, if so, it is a capital illustration of the truth of what was said by Mr. Justice BROWN in delivering the opinion of the Supreme Court in *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S., at page 568, when he said:

Then follows the extract from the Westinghouse case just quoted. The court found for the defendant.

Severy Process Co. v. *Harper & Bros.,* 113 Fed., 581, 584. Patent for improvement in platens for printing presses. Cites *Westinghouse* v. *Boyden Power Brake Co.,* and states the principle in these words, on page 584:

> "Claims should not be so broadened by construction as to include devices which, though accomplishing the same function, do so by new combinations operating upon principles so different as to entitle their originator to be considered as an independent inventor."

Gen. Elec. Co. v. *Allis-Chalmers Co.,* 171 Fed., 666, was for infringement of a patent for "attachment for notched quadrants," which are devices used in the operation of electric motors. It was held that the patent was not infringed. The court refers to the Westinghouse case in these words, on page 669:

> "The complainant's invention was not broadly new; it did, however, make some advance upon the art, and is entitled to a reasonable but restricted application of the doctrine of equivalents. It will be observed that the claim in issue is very broad, broad enough indeed to embrace any and all means of supporting the latch, no matter whether the means were new or old, or within, or without, the range of equivalents. The fact, however, that the defendant's device may be within the language of the claim does not of itself prove that it is an infringement. Infringement is not a mere matter of words. In *Westinghouse* v. *Boyden,* 170 U. S., 537, at page 568, Mr. Justice BROWN in delivering the opinion of the court, said,"

Quoting the same paragraph above.

In the same case on appeal in *Gen. Elec. Co.* v. *Allis-Chalmers Co.,* 178 Fed., 273, the Court of Appeals affirmed the judgment below with this remark, at the close of the opinion on page 276:

> "The mere fact that the defendant's device may be within the letter of the claim sued on is not conclusive proof of infringement. This is shown in the opinion of Judge Cross in the court below (171 Fed., 666). We concur in the conclusion expressed by him in that opinion."

American Stoker Co. v. *Underfed Stoker Co. of America,* 182 Fed., 642. The suit was on a patent to James Garden for mechanical furnace stoker. After a discussion of the prior art and the construction of the devices employed by the parties respectively, the court said, on page 653:

> "We have then an entirely different furnace from the one described by Garden. It is true dead-plates are used, and that the result of their use is that the furnace becomes sealed and the gas does not flow down or the air escape upwards from the air box; but the new function which the defendant seeks to accomplish is by the use of the entire space underneath as a reservoir. I cannot avoid the conclusion that this was not an infringement of complainant's patent.
>
> I am of the opinion that the case of *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S., 537, 568, is authority for this conclusion. The court there said:
>
> 'The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principle of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent.'"

The finding was for the defendant.

Here is another chain of cases beginning with *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S., 537, decided in 1898, and running down to 182 Fed.,

decided in 1910, in every one of which cases the Westinghouse case is followed, and these words quoted or expressly referred to, from page 568 of the report.

These decisions apply in this case with peculiar force. The patent in suit is an old one. It was an old one when this suit was begun. It was issued Sept. 28, 1897. The bill was filed Feb. 24, 1910 (Rec. p. 33). The patent was then over twelve years old. In the meantime the art had been developing. New ore concentrators had come into the field. The Deister was one of them. On pages 16 to 24 of this brief, and particularly on pages 22 and 23, we pointed out minutely the features of construction in which it represented an advance over what had preceded it. That it should be held to be covered by the claims of the old patent would be inherently unjust even though it might come within the letter of those claims. In the Westinghouse case the court found that the Boyden brake was to be regarded as a new invention and Boyden entitled to the rights of an inventor. Those were the words. So is the Deister table entitled to be regarded as a new invention. Even if it could be brought within the letter of the claims of the Wilfley patent, it is not within the spirit and intent of them, as the court again say.

It was not necessary to go beyond the Westinghouse case to make our argument complete. A decisision of the Supreme Court of the United States so recent and so precisely in point is enough to settle the law for this case. But to put the question beyond

cavil we have added the foregoing subsequent cases in which it has been recognized and followed; all which we submit with the deference due from counsel.

THE WILFLEY FILE WRAPPER

The file wrapper of the Wilfley patent is printed in the record on pages 265 to 305. It discloses some facts which are of importance in this argument. The specification as filed is on pages 266 to 275. It described the table exactly as it appears now in Fig. 3. It contained 8 claims, all of which were rejected by the Examiner on numerous references. They were then all erased by the solicitor and 15 others substituted. Of these numbers 1, 2 and 3 were in these words: (Page 281.)

> "1. A transversely inclined concentrating table having a movement whose tendency is to carry the material longitudinally forward toward the tail or foot of the table, said table being provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, the table having a smooth, plain, or unriffled portion extending from the extremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue effected."
>
> "2. A transversely inclined concentrating table having a series of longitudinal riffles extending a portion of the distance from the head toward the tail of the table, the table being provided with a smooth, plain, or un-

riffled portion located at the extremities of the riffles."

"3. A concentrating table having a number of longitudinal riffles extending a portion of the distance from its head toward the tail thereof, the table being provided with an unriffled portion extending from the riffle extremities toward the tail or foot of the table."

These were rejected by the Examiner on Blatchly & Kustel, 258.879, with the remark that claims 4, 9, 10, 12, 13, 14 and 15 might possibly be allowed. (Rec. p. 288-9). The applicant then erased claims 2, 3, 5, 6, 7, 8, 9 and 11 and amended claim 1 by inserting the words "of varying length" and the words "said riffles varying in length for the purpose specified," and changed the number of claim 4 to 2; 10 to 3; 12 to 4; 13 to 5; 14 to 6; and 15 to 7; and the claims as thus renumbered were allowed. In an argument responding to the rejection of the original 8 claims the applicant described the washing up process which takes place at the terminals of the riffles adjoining the "smooth portion A" in the same language in which it is described on page 2, lines 7 to 56 of the patent as issued. (Rec. p. 278, 7 bottom lines, to p. 280, first par.) In his argument in support of claim 1 as finally amended the solicitor said this:

"The claim is also believed clearly allowable, in view of the Blatchly reference, since his riffles or corrugations formed in the rubber applied to the table, are all of the same length. Hence, his table will not perform the function of applicant's table.

Here is the "function" of which we have heard so much—the washing up process of the Wilfley table.

To appreciate the full meaning of this disclaimer will require a description of the Blatchly & Kustel table. A zincograph of it is among the foregoing reproductions and we insert it here again for reference.

Blatchly & Kustel, 258, 879, June 6, 1882.

This patent proposes an elaborate scheme of ore concentration, having no less than five pairs of tables carried on one supporting frame. The cut here inserted shows the whole mechanism. But the patentee says that one pair may be used singly, and we will therefore refer in our discussion to the upper pair only, a top view of which is shown in Fig. 2 of the drawing. The upper half of this figure represents the wooden floor prepared for the rubber covering shown in the lower half of the same figure. It is formed from two thicknesses of narrow strips of wood laid at right angles to each other and fastened together at their intersections by screws or nails. The drawing shows the construction clearly. The object is to make a floor for the table that will not warp. The complete top view of the working table is therefore shown in the lower half of Fig. 2.

It is covered with a sheet of India rubber J, part of which is corrugated, like that used for stair carpet, and the remainder smooth. The corrugated part is plainly distinguishable in the drawing from the smooth part, which shows in white. The corrugations form riffles. The pulp is delivered upon this riffled surface through a strainer, M. The table slopes from the left hand end, or the head, to the right, as shown in

(No Model.) 2 Sheets—Sheet 1.

A. BLATCHLY & G. KUSTEL.

ORE CONCENTRATOR.

No. 258,879. Patented June 6, 1882.

Fig. 1

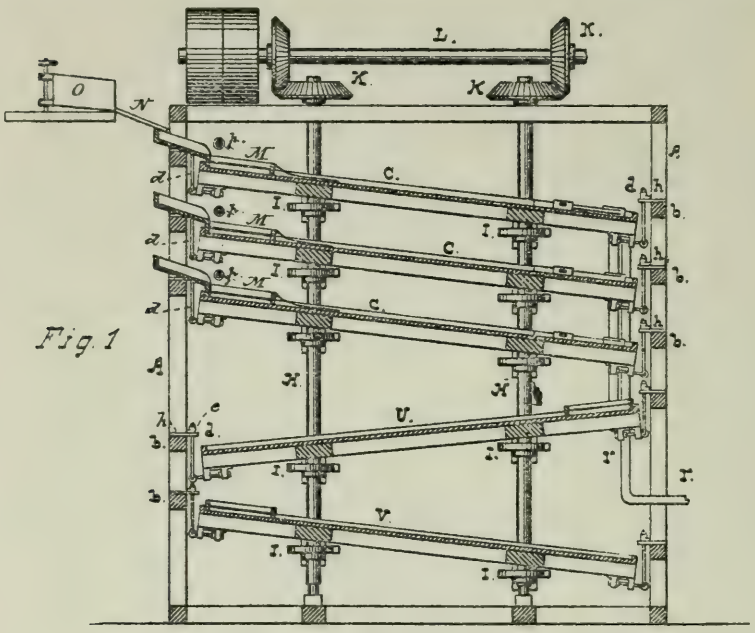
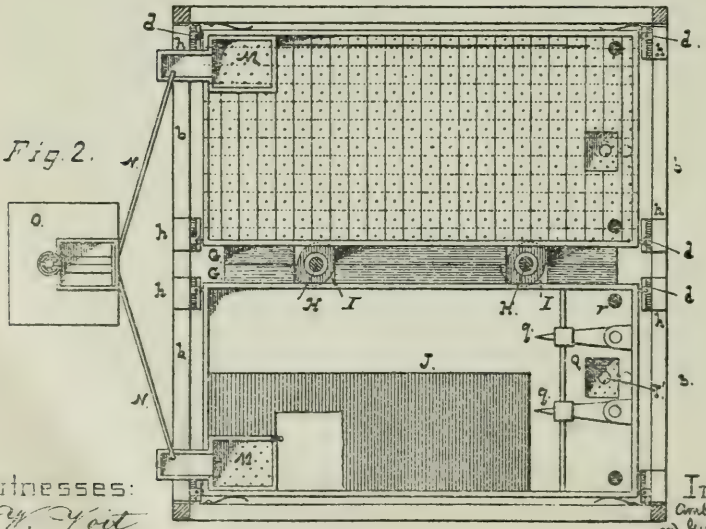


Fig. 2.



Witnesses:
W. Voit
E. G. Clark

Inventors
Andrew Blatchly
and Gustav Kustel
Pyther Allys., Noyes & Baker

the side view of the upper table at C in Fig. 1. Now we see the operation.

The pulp flows down the table across the riffles to its foot. As it goes the particles of metal lodge in the troughs between the riffles—some in each trough, as the pulp passes over; so that by the time it reaches the foot of the riffled surface there is little mineral left in the pulp. While this process is going on a reciprocating movement is taking place which impels the material in the riffle troughs forward toward the smooth space adjacent to their terminals. The mechanism by which this movement is produced may be described as follows Two vertical shafts shown at H H in Fig. 1 extend from top to bottom of the apparatus. These shafts carry cams I I—one pair for each pair of tables. These shafts and the cams attached to them are shown in cross section at H H in Fig. 2. The cams act on bumper bars G G, first to force the two tables apart a little way, and then let them come together, which they do by their own weight. Each table hangs suspended on four links at its corners, so that it has a slight swing to and fro. These links are shown most plainly at *d d* in Fig. 1, but their upper ends appear under the same letters in Fig. 2. As the cams revolve the two tables are first separated a short distance and then swing together with a gentle bump. This furnishes a true reciprocating movement by which the material in the riffle troughs is impelled toward their terminals, where it is delivered upon the smooth space adjoining those terminals. Water is supplied to the table from a perforated pipe p, shown in cross-section three times in Fig. 1.

The jets of clear water from this pipe wash the pulp as it flows across the riffles, carrying the lighter constituents down to the foot of the table, and flooding the smooth space in front of the riffle terminals. At the lower part of the smooth space are two adjustable dividers *q q*, the outer ends of which can be adjusted toward either side of the table so as to divide the material moving down into three parts. In accordance with the principle stated in our description of the Wilfley patent the reciprocating movement operates to drive the solid particles of metal across the table more rapidly than the lighter grains of sand. This results in an assorting process on the smooth space. The pure concentrates are driven farthest toward the inner side of the table, where they pass into the concentrates box through the hole *r;* the middlings pass between the two dividers, and are taken off through the strainer Q. The coarser constituents of the middlings are worthless and are taken out by the strainer and go to waste. The finer parts pass down through the pipe *r'* to the table below to be retreated. The worthless gangue passes off across the space outside the outer divider *q*. These dividers being adjustable in position can be moved inwardly or outwardly so as to cause the concentrates, middlings and gangue to leave the table in proper proportions. We will conclude this description by quoting the patentee's general statement of the principles upon which the apparatus operates—page 2 of the specification, line 30 to 46.

> "The pulp, when thus sifted upon the upper outside corner of the concentrating surface,

> will begin to flow down toward its lower end; but the constant motion and concussion or jar will cause the heavier particles to separate and settle to the bottoms of the corrugations and be carried by the concussion directly across the table to the smooth surface, over which they will move in a diagonal direction to the lower corner of the table. The angle which the particles will take on moving across the smooth inclined surface will be greater or less according to their specific gravity, because the heavier the particles the more sensitive will they be to the concussion or jar, while the lighter particles, being less sensitive, will move down the incline in a more nearly direct line."

We can now see at a glance the patentee's scheme. It was to treat the material first on the upper pair of tables, and save the clean concentrates extracted there; then retreat the middlings on the next pair below, and so on until the last vestige of value had been extracted. For obvious reasons the machine never went into general use. It was too complicated. But taking the top pair of tables by themselves, with such enlargement of area and modification of riffles as practical use would soon suggest it would be an efficient and successful ore concentrator. It embodies all the elements and principles of some of the best tables in use today.

This is the Wilfley table in every respect except the feature of progressively increasing length in its riffles, and it was patented *14 years before the Wilfley patent was applied for.* The pulp flows down across its riffles in the same way; the metallic particles are caught in the riffle troughs in the same way, and

driven along those troughs by a reciprocating movement and out upon a smooth space in the same way; and the concentrates are washed up by flowing water on the smooth space in the same way. The only difference is that the riffles are of uniform length instead of progressively increasing length, as on the Wilfley. There was nothing left for Mr. Wilfley except exactly what he got; and he took it without a word of complaint. In this narrow field of invention, with its multitude of patents, does not the law, as we have laid it before the court, and intrinsic justice as well, require the court to hold the appellee to its patent and its claims and reverse the judgment below?

Equal in importance to the reference to the Blatchly and Kustel patent in the Wilfley file wrapper is the fact that in the original application for the Wilfley patent the first claim contained no reference to any smooth or unriffled space on the table. It was in these words:

> "1. The transversely inclined concentrating table having longitudinal riffles varying in length, the riffle nearest the upper edge of the table being shortest and that nearest the lower edge of the table longest, while the inter-intermediate riffles increase in length from the upper part of the table downward." (Rec. page 273, lines 2 to 7.)

This claim was rejected by the Examiner on numerous references, (Rec. p. 276, last line, to p. 277, first three lines) and was withdrawn by the solicitor with all his other original claims (Rec. p. 280, last two lines) and does not appear again. Mr. Wilfley therefore asked for a claim covering his longitudinal riffles

varying in length, but omitting the smooth or unriffled space adjoining their terminals. Having acquiesced in the rejection of that claim he cannot now be heard to assert that his claims as allowed can be construed to include any form covered by the rejected claim.

THE LAMPERT PATENT

One more patent remains to complete this argument. It is number 533,336, issued Jan. 29, 1895, to Jacob Lampert.

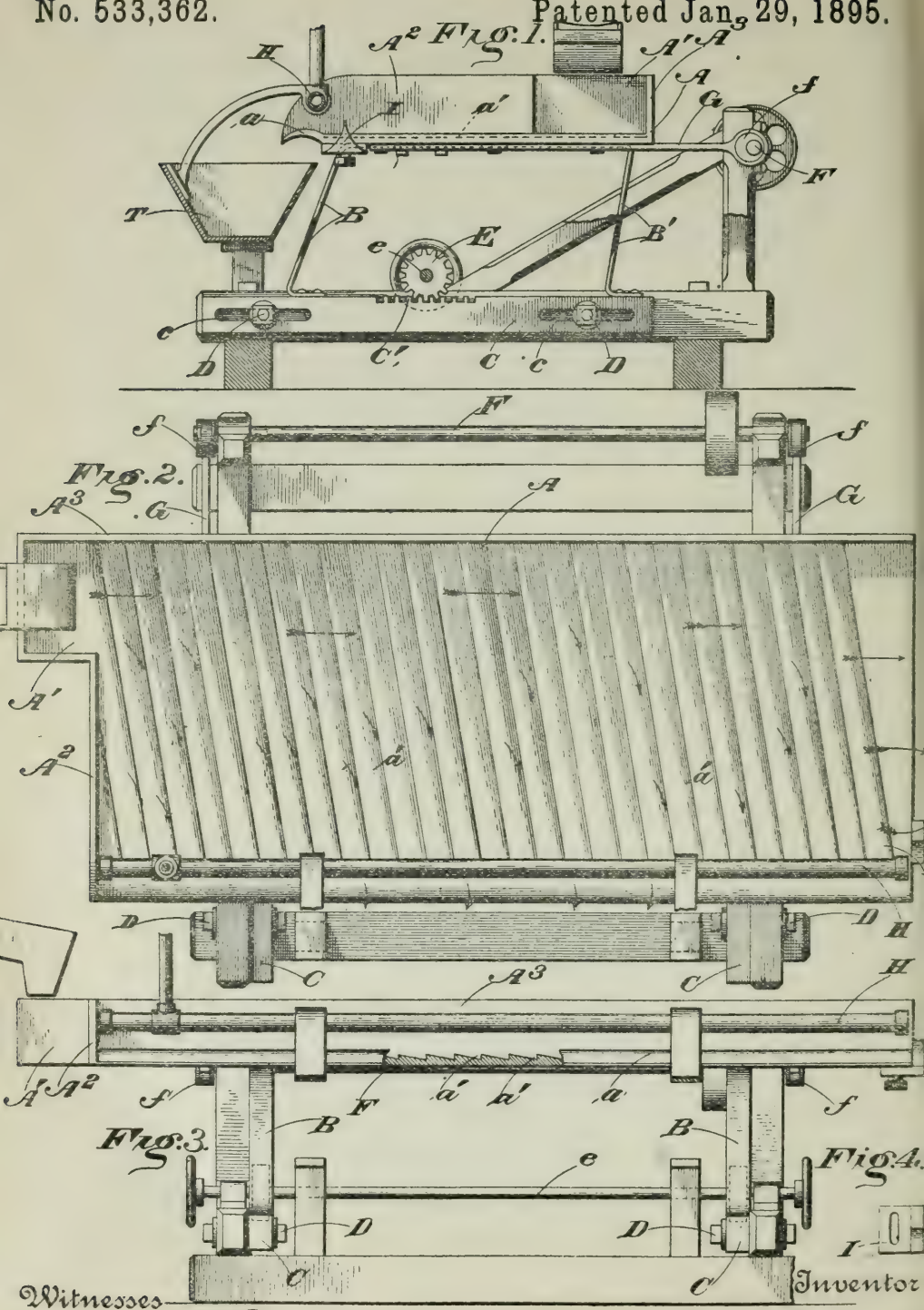
This is a short patent, the drawings occupying one page, and the specifications and claims less than two. The cut here inserted is a reproduction of the drawings. Fig. 2 shows the deck. A reciprocating movement is communicated to the table from a shaft F actuating two cams *f f* connected with the table by straps G G. Because of the slightly diagonal position of the riffles on the table the reciprocating movement is not exactly in line with them. But it is nearly enough so to produce its characteristic effect upon material on the table. At A' is the pulp box, and from that end the table slopes toward the foot. There is mechanism (shown in Fig. 1) by which the slope can be varied. As the pulp flows down the table the main mass of it takes the course across the riffles indicated by the large, feathered arrows. Under the influence of the reciprocating movement the concentrates gradually turn toward the riffle tips, as indicated by the little, tailless arrows, and go into the concentrates box at the side of the table.

(No Model.)

J. LAMPERT.

CONCENTRATOR.

No. 533,362. Patented Jan. 29, 1895.



Witnesses
M. E. Fowler.
James R. Mansfield

Inventor
Jacob Lampert
by Alexander & Dowell
Attorneys

In a side view in Fig. 1 is shown the concentrates box T and the devices employed for final washing up of the concentrates. The specification says—page 1, line 65, "Along the delivery or front side of the table is a bead, or flange *a*, which rises slightly above the top of the table, and over which the concentrates escape into a trough T, or other receiver." At H in Fig. 2 is shown a water pipe extending along the lower edge of the table. The same water pipe appears in cross section at H in Fig. 1. It is perforated, and sprinkles the surface of the bead with a continual flow.

The word "bead" is an unusual name to apply in such a connection, and as shown in the drawing, it would seem to be a rather sharp obstruction for the concentrates to climb over. But there are no limitations in the patent as to its height or width, so that the constructor can make it as flat and broad as he chooses, and there is no reason, apparently, why the table may not work well. Besides, the patentee proposes, as he says, to run the vibrating mechanism at the rate of about six hundred vibrations per minute. The usual rate is about half that.

The signifigance of this patent lies in its resemblance to the Deister table here in controversy. While the outside lines of the table are rectangular, the space occupied by the riffles is rhomboidal, like the Deister. As in the Deister, the pulp flows down the longer dimension of the table, gradually losing its metallic values until the gangue goes off at the foot. Meanwhile the particles of metal turn aside in obedience to the impulses of the reciprocating movement to follow the

riffle troughs to the concentrates discharge, as in the Deister. It will not be pretended that the owner of the Wilfley patent could enforce it against a table like this. The Lampert patent is over two years and a half older than the Wilfley. Such a suit would be ridiculous. While the Deister table came into the art many years after the issue of the Wilfley patent, it harks back to the prior art in its construction and operation. That fact lends emphasis to the other arguments which establish on many grounds the non-infringement of the Wilfley patent by Deister No. 2.

While the Blatchly & Kustel patent stands as an absolute limitation on the Wilfley patent in respect to the scope of its claims, it and the Lampert patent are also pertinent to the point that Wilfley was only an improver and not a pioneer in the art; and as a mere improver subject to the limitations in the scope of his monopoly which are laid down in *McCormick* v. *Talcott* and *Railway* v. *Sayles* and the great chain of cases following them. They are of themselves sufficient to negative any claim by Wilfley to the standing of a pioneer. But there are many others. There are 21 named on pages 47 and 50 of the record. They were all put in evidence by the defendant at the hearing, and copies of all of them were furnished to the clerk for the record here. By some mishap only a part of them appear in the printed volume. But the omission is not important, as there are enough of them in the record for the present purpose. The following among them may be named as ore concentrators prior to Wilfley.

Waitt	513,849,	Jan. 30, 1894,	Rec. p. 310.
Gates	415,999,	Nov. 26, 1889,	Rec. p. 320.
Wilder	149,622,	Apr. 14, 1874,	Rec. p. 327.
Chatterson	528,503,	Oct. 30, 1894,	Rec. p. 330.
Look	526,242,	Sept. 18, 1894,	Rec. p. 336.
Krause	349,504,	Sept. 21, 1886,	Rec. p. 343.
Pike	566,534,	Aug. 25, 1897,	Rec. p. 349.
Lampert	533,362,	Jan. 29, 1895,	Rec. p. 353.
Blatchly & Kustel	258,879,	June 6, 1882,	Rec. p. 357.

We have therefore, nine ore concentrator patents printed in the record, running from 1882 to 1895 in date, and all prior to Wilfley. These are enough to show that Mr. Wilfley stands far down in the line of improvers. He cannot possibly escape the force of the authorities which limit his monopoly to substantially his own form.

EXTENSIVE USE

The experts for the plaintiff in the District Court had much to say of the extensive use of the Wilfley table. In fact, apart from the claim that it embodied a new principle or function, which claim we have discussed, they had no argument to offer in its behalf except that a great many had been sold —many thousands, it was said. They offered no evidence to show that it was a better concentrator on its merits than any other—that it could do more work, or better work, or cheaper work than any other. If the validity of the patent had been in dispute, this evidence of extensive sales would have been competent. The fact that a patented article is received with great favor is some

evidence that it took invention to produce it. If common skill could have supplied it, mechanics and engineers would have been glad to furnish it. Extensive sale is therefore some evidence of *invention* when that question is in doubt. But it is weak evidence, even then. There are so many other things that influence sales. Energetic exploitation by a strong manufacturer like the Mine and Smelter Supply Company, with large profits to make, is the most common cause of great sales. So that it is only when the question of validity is in issue and is doubtful that it is admissible. The cases on this subject are numerous.

In *McClain* v. *Ortmayer,* 141 U. S., 419, the suit was on two patents for improvements in horse collars. On page 427 of the report the court states the position of counsel for the patentee as follows:

> "Counsel for the plaintiff in the case under consideration has argued most earnestly that the only practical test of invention is the effect of the device upon the useful arts—in other words, that utility is the sole test of invention, and, inferentially at least, that the utility of a device is conclusively proven by the extent to which it has gone into general use. He cited in this connection certain English cases which go far to support his contention."

After pointing out the difference between the English patent law and ours in this respect, the court added, on page 428:

> "It is evident that these principles have no application to the patent system of the United

States, whose beneficence is strictly limited to the invention of what is new and useful, and that the English cases construing even their more recent acts, must be received with some qualification. That the extent to which a patented device has gone into use is an unsafe criterion even of its actual utility, is evident from the fact that the general introduction of manufactured articles is as often effected by extensive and judicious advertising, activity in putting the goods upon the market and large commissions to dealers, as by the intrinsic merit of the articles themselves."

To like import is *Duer* v. *Corbin Cabinet Lock Co.*, 149 U. S., 216, where the suit was on a patent to Morris L. Orum for improvement in furniture locks. On the subject of the extensive sale of the invention the court remarked as follows, on pages 223-4:

"It is true the Orum lock seems to have gained an immediate popularity, to have met with large and increasing sales, and to have had the usual effect of successful patents in stimulating the activity of business competitors to produce an equally useful and popular device. Were the question of patentability one of doubt this might suffice to turn the scale in favor of the patentee. But there are so many other considerations than that of novelty entering into a question of this kind that the popularity of the article becomes an unsafe criterion. For instance, a man may, by the aid of an alluring trade-mark, succeed in catching the eye of the people, and palming off upon them wares of no greater intrinsic value than those of his rivals; but such trade-mark may be, and usually is, wholly destitute of originality,

> often taken from some prior publication, and appropriated to the specific purpose of the owner. The same result may follow from the more attractive appearance or the more perfect finish of the article, from more extensive advertising, larger discounts in price, or greater energy in pushing sales."

See also *Union Biscuit Co.* v. *Peters,* 125 Fed., 601, (C. C. A., Eight Cir.) p. 608-9.

Fernald v. *Oneida Nat. Chuck Co.,* 167 Fed., 559, 564.

Beckwith v. *Malleable Iron Range Co.,* 174 Fed., 1001, 1008-9.

Walker on Patents, Fourth Ed., Sec. 40 and note.

These cases establish that it is only where the question of utility is in doubt that extensive use is a fact to be considered. That question can arise only when the validity of the patent is in issue, as it is not, here. The validity of the Wilfley patent is admitted. That carries with it an admission of novelty, invention and utility in the patent. The only issue is non-infringement. Upon that question extent of use has no bearing whatever.

THE DISTRICT COURT DECISIONS

The bill sets up an adjudication in the Circuit Court for the District of Colorado in a suit brought by Arthur R. Wilfley against the Denver Engineering Works and Ira C. Cammett and Frank E. Shepard for infringement of his patent, in which judgment was rendered for the complainant. This was before the

assignment of the patent to the Mine and Smelter Supply Co. The case is reported in 111 Fed., 760. This judgment, although set up in the bill, has none of the effect of an estoppel, or to put the defendant on its defense upon the merits of the case as it would have if the bill were for a preliminary injunction. It has no effect beyond the persuasive force of a precedent to be weighed and counted for what it is worth. And that is not much.

The main issue discussed was the one of validity. As to that the court was right in finding the patent valid. The description in the opinion on page 763 of the washing up process on the Wilfley table is accurate, and the sentence with which it concludes, "and it is the taking advantage of this diagonal arrangement by the adjustment of the riffles with reference thereto, that is new and valuable in the patent," is entirely true. But upon the question of infringement the court went astray, which is not strange. It was the first suit ever tried for infringement of an ore concentrator patent, so far as appears, or so far as we are aware. Manifestly the court was not familiar with the prior art, for it classed the Wilfley patent as a pioneer. If it had been that, there would be little fault to find with the decision. But treating the Wilfley patent as we have shown it must be treated—as an improvement patent merely, the finding of the court on the question of infringement cannot be supported. The court looked at the Wilfley table just as it would at any other sort of machine. It felt itself at liberty to extend its claims to any similarity of construction found on

any part of the surface of another table. Because the riffles of the Cammett and Shepard table at a place midway their length declined in elevation along a diagonal zone across the table they were taken as the equivalents of the Wilfley riffles, and because the riffles on that part of the table below the central portion were flattened out so as to leave only very narrow spaces between them, the court took that part of the table as the equivalent of the smooth space A on the Wilfley. But this view rests upon a misunderstanding of the operation of the table. The material which passes along those narrow channels between the flattened riffles is pulp in the process of concentration—partly concentrated. It is pushed along those channels by the reciprocating movement; the jarring produced by that movement promotes the gravitation of the metallic particles to the bottoms of the channels, which brings the sand to the top where it is exposed to the cross flow of the water and washed off at the tailings side. That is not at all what takes place on the smooth space A of the Wilfley table.

But all this is unimportant here. We have no quarrel with that part of the opinion which finds the Wilfley patent valid, for we admit that; and as to that part of it which finds infringement, it need not concern us, because the Deister table is a totally different structure from the Cammett and Shepard. It may be that the Cammett and Shepard table infringed the Wilfley patent and that the Deister table, which came into existence a number of years after that decision, and represents a large advance in the art, does not.

The only other reported case that we are aware of is *Mine and Smelter Supply Co.* v. *Braeckel Concentrator Co.* et al., 197 Fed., 897. In that case the defendant set up a big fight against the validity of the patent, the consideration of which occupies the greater part of the opinion, but which, as we have said, does not interest us here. It is a little uncertain from the description of the defendants' table contained in the report how the riffles on it were arranged, but from what appears in the opinion on page 906 it seems likely that the table was such a close imitation of the Wilfley table that it could be classed as a mere evasion. The decision is not one to carry weight. It contains no discussion of the prior art nor of the claims—not even a copy of them, and no reference to any authorities on the subject of infringement except one on page 907, which expressly applies to a pioneer invention. It throws no light whatever on the questions in issue here.

FINALLY

A few words of review will close this long brief. At the beginning we described the Wilfley and the Deister tables with a drawing of the concentrating surface of each; analyzed the patent and the claims in suit, and showed by the application of the words of the claims taken in their plain and ordinary sense to the Deister table that it does not infringe the Wilfley patent. From page 8 to page 34 of the brief are occupied with this argument. On pages 34 to 43 we cited a number of cases on the construction of claims which supported the argument we had made. We thus demonstrated in short order the error of the judgment of the District Court UNLESS for some reason or other the Wilfley patent is entitled to an exceptional standing before the law and treatment by the court. The District Court supposed that it was, and for that reason fell into error. We have pointed out on page 43 to page 67 *ante* how and where the court went astray.

The appellee must stand by that decision, and the main endeavor of counsel here will be to find some ground on which to base their contention that the Wilfley patent is entitled to extraordinary consideration by the court. It is impossible to claim that Wilfley was a pioneer in the art of ore concentration in the face of the prior ore concentrator patents enumerated on page 143 *ante*. Counsel may sneer at them as paper patents. But every one of them carries with it a presumption of validity, which holds

until it is overturned by proof. That has not been done as to any one of them or any other ore concentrator patent. There is no reported case holding any ore concentrator patent void. All the hundreds of patents for ore concentrators now outstanding must be taken for the purpose of this case as valid. The patents enumerated in that list are therefore effective to put the Wilfley patent far down in the procession of improvement inventions. We suppose that the plaintiff had a right to prove by evidence that the prior patents enumerated in the defendant's answer were unworkable devices, but it did not offer any such evidence. It is too late now to make the objection. While the general rule is that an improvement patent is to be held to a narrow construction, as the cases we have cited abundantly show, that rule is sometimes relaxed in favor of an improvement invention of extraordinary merit. It is impossible to frame a hard and fast definition of those cases, but the patents must disclose inventions of extraordinary value to the public. The most noted case of this kind is what is known as the Brake Beam case— *National Hollow Brake-Beam Co.* v. *Interchangeable Brake-Beam Co.*, 106 Fed., 693. In their brief in the District Court counsel for the complainant cited this case over and over many times. But it has no relevance here except as an illustration of the favor which may be extended to an improvement invention of extraordinary merit in a suitable case. The subject matter was of the highest importance—the control of railway trains; its value in that great field was almost immeasurable.

An ore concentrator is a mere chip by the wayside in comparison. And yet the principle which was applied there could undoubtedly be applied in the field of ore concentrators. We can imagine the existence of a concentrating table of extraordinary merit—a table distinguished above others in excellence so distinctly and undeniably that the patent covering it would be justly entitled to a wider range of equivalents than that ordinarily accorded to such patents. But those qualities must be shown by evidence. Where is it in this case? The experts lauded the patent to the skies, as we have shown on pages 68 to 75 *ante*. But no one testified that it would work with more economy of power; or treat more pulp in a day; or get more value out of the pulp treated on it; or lose less value in the tailings; or turn off purer concentrates; or anything of that kind. These are the elements of excellence in an ore concentrator, and there is no evidence that they are found in any extraordinary degree in the Wilfley concentrator. It is just a fairly good table with the advantage of simplicity of construction and convenience of operation. There are no facts on which to base a claim for special favor for the patent. The table has, in consequence of its combination of progressively lengthening riffles with a single unriffled space adjoining their terminals, a washing up process for which great merit was claimed by the experts, who paraded it as a principle or function so new and valuable that it entitled the patent to special consideration. But that was a mere incident of the structure of the table, for which alone the patent was or could

be granted—not for a principle or function. It was *one way* of washing up; not the only way, nor the best way.

It was these unfounded pretensions of the experts that led the judge of the District Court to knowingly disregard the plain language of the claims. He was aware that he was not giving effect to them, but he thought that some extraordinary excellence in the patent made it his duty to find as he did. He did not define that excellence further than to state the plaintiff's claim that "the Wilfley patent embodied a new principle in the art of wet concentration of ore and the machine patented was the first to perform a new and definite function in the practice of ore dressing so as to produce both increased efficiency and capacity." (Rec. p. 64, l. 15 to 20). On pages 47 to 67 *ante,* we have shown by extended, not to say wearisome references to the record, that this was not true in any particular. It follows that the Wilfley patent must take its place among the improvement patents and be judged by the same rules of law that apply to the others.

In the taking of the proofs in the District Court the plaintiff examined six witnesses in *prima facie*—all as experts except one. Their depositions in the condensed and abbreviated form required by the new equity rules occupy from page 141 to 204 in the record, making 63 pages. In the original record it occupied 297 pages. The defendant then put in the testimony of 14 witnesses, the condensed statement of which

occupies 13 pages of the record—(p. 237 to 250)—the original printed record occupied 143 pages.

The testimony of Browne, the expert, was taken at Washington. The testimony of Bensman and O'Connell and Reid was taken at Fort Wayne, Ind. The others were all taken at Morenci, Arizona, right at the doors of the mines in which the Deister tables here in controversy were at work. In the testimony of John Kiddie (Rec. p. 240-242) the Deister and its mode of operation were described with a drawing of it (Rec. p. 240), including a test of the material passing between the deflected portions of the riffles on it (Rec. p. 243-4), the relative sizes and weights of the Wilfley and Deister tables and a comparative test of output of the Wilfley and Deister tables. (Rec. p. 246-7).

This was the defendant's case. It showed that the Deister was a little table with a concentrating surface of 36.6 sq. ft. against 78 sq. ft. in the Wilfley, and a shipping weight of about 1500 lbs. against about 2800 lbs. for the Wilfley, *but capable of doing as much work and doing it better.* All these drawings, tests, dimensions and figures are before this court in the hands of the clerk as exhibits, and we have reproduced a number of them in this brief. Counsel for the complainant attended all the examinations and cross examined the witnesses at length and was offered opportunity to verify all the tests. In the innocence of our hearts we thought this was enough to acquit our client. The complainant did not undertake to disprove a single fact to which our witnesses had

testified. Those being admitted, there was nothing to rebut. Nothing remained but a question of law—were the facts offered by us a bar to the complainant's suit? But to our astonishment the complainant proceeded to offer 721 pages of so-called rebutting proofs, of which 609 pages are contained in the exhibit volume on file entitled "Book of Complainant's Paper Exhibits, Drawings and Photographs," which we hope the court will find time to examine. It will be found to contain at the close 145 pages of photographs which have about as much relevance to this case as a photograph of the transit of Venus.

We yield to no one in loyalty to the patent system of the United States. We believe the patent statutes have had more to do with the marvellous industrial development of our country than any other laws. We believe in the firm maintenance of the just rights of patentees. But greedy human nature, here as elsewhere, is never satisfied. It is not enough for the appellee to enjoy through all these years the enormous profits on thousands—many thousands of Wilfley tables which it has sold. It will be content only with the extermination of the little Deister.

2 Samuel, chap. 12, v. 1-4.

Respectfully submitted,

ROBERT S. TAYLOR,
ELWIN M. HULSE,

Solicitors and of counsel for the Appellants

(No Model.) 2 Sheets—Sheet 1.

A. R. WILFLEY.

ORE CONCENTRATOR.

No. 590,675 Patented Sept. 28, 1897.

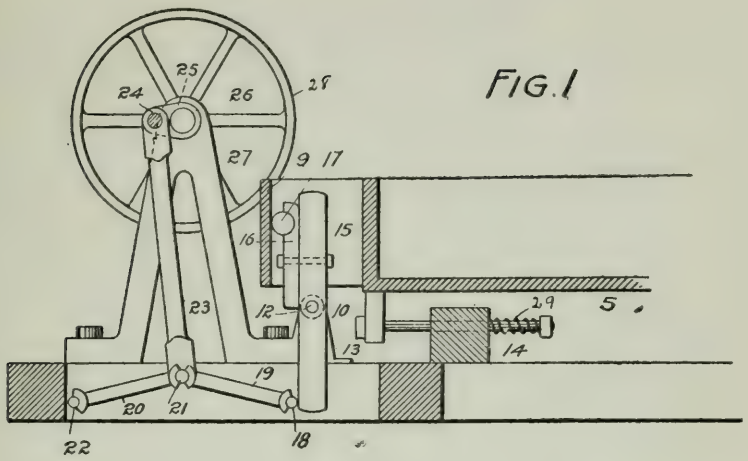


FIG. 1

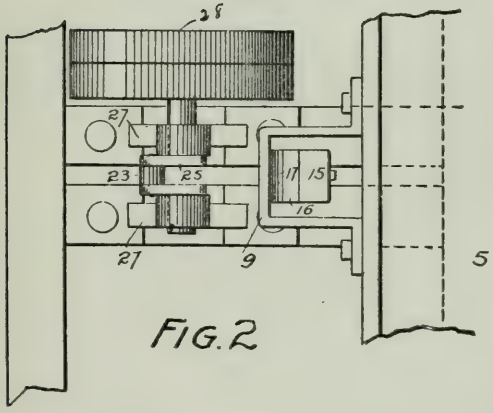


FIG. 2

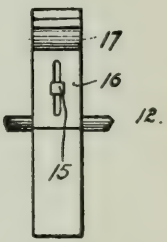


FIG. 6.



FIG. 7



FIG. 5

Witnesses
Edith Hemsworth.

Inventor
A. R. Wilfley

By his Attorney

(No Model.) 2 Sheets—Sheet 2.

A. R. WILFLEY.

ORE CONCENTRATOR.

No. 590,675 Patented Sept. 28, 1897

FIG. 3.

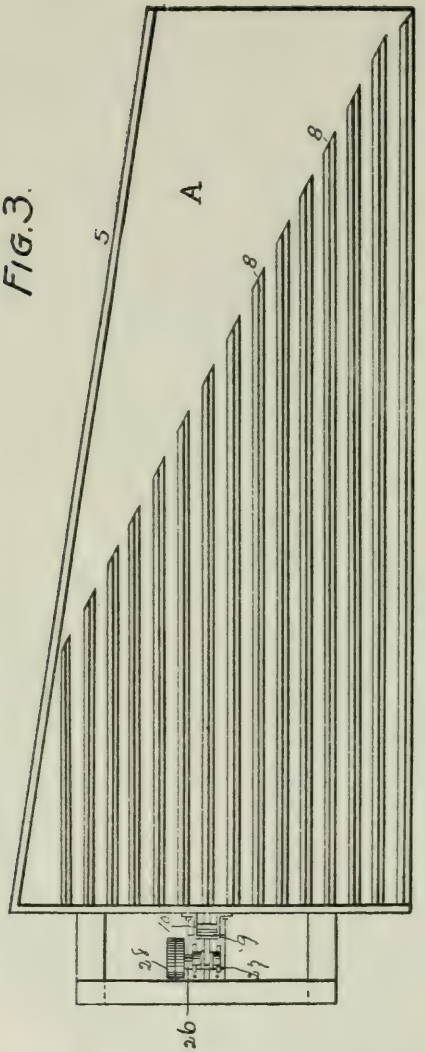
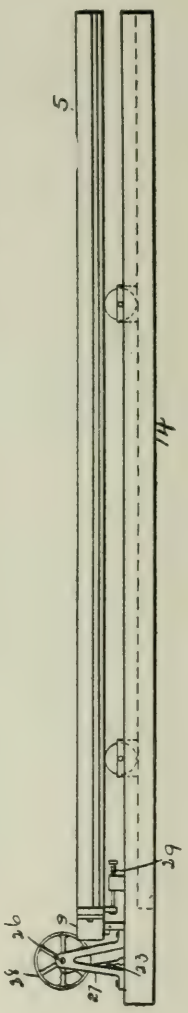


FIG. 4.



Witnesses
Edith Hinsworth

Inventor
A. R. Wilfley
By his Attorney

UNITED STATES PATENT OFFICE.

ARTHUR R. WILFLEY, OF DENVER, COLORADO

ORE-CONCENTRATOR

SPECIFICATION forming part of Letters Patent No. 590,675, dated September 28, 1897.

Application filed March 18, 1897. Serial No. 627,798. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR R. WILFLEY, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Ore-Concentrators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in ore-concentrators; and it consists of the features hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation of the apparatus, partly in section. Fig. 2 is a top or plan view of the same. Fig. 3 is a plan view of the table. Fig. 4 is a side elevation of the same. Fig. 5 is a cross-section of the table. Fig. 6 is a detail view of a lever forming a part of the operating mechanism. Fig. 7 is a perspective view of one of the riffles detached.

Similar reference-characters indicate corresponding parts in the views.

Let the numeral 5 designate the table, provided with longitudinal riffles 8, attached to its upper surface. These riffles are of unequal length and angular in cross-section. The vertical or upwardly-projecting part of the riffle is designated by the reference-character 8*, and the upper part, which lies parallel with the bed of the table, is designated by the reference-character 8'. The table tapers from the head toward the foot, where it is narrowest. It is transversely inclined, (see Fig. 5,) the gangue being discharged at its lower edge and the mineral at the tail thereof. The riffles increase in length from the upper edge of the table downward, where they are longest. The lowermost riffle extends nearly the full length of the table.

To the left of the riffle extremities (see Fig. 3) there is a triangular portion A of the table, which is smooth or free from riffles. The function of this smooth or unriffled portion of the table will be hereinafter described.

The table has a longitudinal reciprocating movement and is supported on rollers 7, mounted on a suitable stationary support.

The mechanism for actuating the table will now be described.

The extremity of the table farthest to the left (see Figs. 1 to 4 of the drawings) will for convenience of description in this specification be termed the "head," while the opposite extremity is termed the "tail" of the table.

To the head end of the table is attached a keeper 9, which is engaged by one extremity of a vertical lever 10, fulcrumed at 12 on a support 13, mounted on the stationary frame 14. The upper arm of the lever 10 is slotted (see Fig. 6) to receive a bolt 15, which holds a block 16 in place on the lever. This block carries an antifrictional roller 17, which engages the outer wall of the keeper 9. The block 16 is adjustable for the purpose of changing the bearing-point on the keeper and thereby regulating the length of the table's stroke.

The lower arm of the lever 10 is provided with a bearing 18, which is engaged by one extremity of a link 19. This link is connected at 21 with a link 20, forming a toggle-joint. One extremity of the link 20 engages a bar 22, attached to the stationary frame. The pin 21 connecting the two toggle parts also passes through one extremity of a pitman 23, whose opposite extremity is connected with a wrist 24 on a crank 25, carried by a shaft 26, journaled in an upright support 27, mounted on the stationary frame 14. The shaft 26 is provided with a pulley 28, which may be connected with any suitable motor for operating the mechanism. The outer extremities of the toggle are open, being simply recessed or forked to engage the bearings 18 and 22, respectively. Hence as the shaft 26 is rotated the toggles only impart the backward movement to the table or move it toward the left. (See Fig. 3.) The forward or reverse movement is effected or imparted by the recoil of a spring 29, which is compressed or placed under tension by the table during its backward movement.

In the operation of the machine the material to be treated is discharged in the form of

pulp upon the upper left-hand corner of the table. (See Fig. 3.) The gangue passes transversely downwardly over the angular longitudinal riffles and is discharged over the lower edge of the table, which, as before stated, is transversely inclined.

All the mineral, together with a portion of the gangue, is first caught by the riffles, and under the influence of the table's motion is carried longitudinally toward the foot of the table until it reaches the smoother unriffled portion A of the table, where it is acted on by the water, which effects a perfect or approximately perfect separation of the gangue from the mineral. As the material caught by the uppermost and shortest riffle passes to the portion A of the table the action of the water, which is fed to the upper edge of the tables, carries the gangue downward to the next riffle, while the mineral remains on the smooth portion A and is carried toward the tail of the table, where it is finally discharged. It is expected that some of the mineral caught by the uppermost and shortest riffle will be carried downward with the gangue to the next riffle, which is longer. After leaving this last-named riffle and passing to the smooth or unriffled portion of the table the water again acts on the material and carries the gangue downward to the next riffle, leaving the clean mineral on the smooth portion A of the table. If any mineral escapes with the gangue the second time, it will be caught by the riffle next below and again subjected to the separating action of the water as soon as it reaches the smooth portion A of the table. In this manner the material is carried transversely downward and longitudinally forward, the gangue being discharged at the lower edge of the table completely impoverished of its mineral values, while the latter are discharged at the foot or tail of the table. A portion of the gangue—that is to say, the lighter part thereof—passes over each riffle in succession from the shortest or uppermost to the longest or lowermost riffle. The mineral and the heavier gangue are caught by the riffles and finally separated on the smooth portion A of the table. This combination, in a concentrating-table, of riffles of varying length for catching the mineral and a smooth, plain, or unriffled portion at the extremities of the riffles, where the final separation is effected through the action of the water, is believed to be entirely new in an apparatus of this class.

A riffle is the best means of catching mineral, while a smooth, plain, or unriffled surface is the best for effecting the separation of the mineral from the gangue caught with the mineral by the riffles, the separation being effected by the action of water.

While I prefer to employ the angular riffle shown and described in this application, I do not limit the invention to any special construction of riffle.

The function of the angular riffles will now be described in detail.

The part 8^a of the riffles would be sufficient alone to catch the larger and heavier particles of mineral, but some of the more minute particles would be forced over the riffles and carried downward with the gangue and perhaps finally lost were it not for the part 8^c of the riffles, which checks this tendency and allows specific gravity to prevail, the same as in hand-panning. It is well known that the finest particles of mineral can be saved by hand-panning. The specific gravity of the finest particle of gold is, of course, the same as the largest nugget, and if the proper conditions exist the minute particle can be saved as well as the nugget. The object of my angular riffles is to produce the conditions necessary to save not only the largest but also the finest mineral particles. Under ordinary conditions these fine particles when acted on by a current of water are carried along with the water, and consequently lost with the gangue. The upper part 8^c of my riffle checks the tendency of these light particles to pass over the riffles with the water. Hence they are confined by the bed of the table below the part 8^c of the riffles above, while the part 8 of the riffles checks their downward movement. Hence under the influence of the table's movement or vibration the mineral particles, both fine and coarse, are caught by the riffles.

It will be observed by an inspection of my operating mechanism that the length of the table's stroke may be regulated without changing, altering, or interfering with the quality of the movement imparted by the toggle.

With other toggle movements as applied to this class of machines the length of stroke is regulated by changing the point where the lower extremity of the connecting-rod or pitman is attached to the toggle. This is equivalent to changing the length of the pitman and of course not only changes the length of the table's stroke, but also the quality of the movement. For instance, if the pitman be made shorter the point where the toggle-links are connected must move farther upward, but not so far downward, and vice versa. In other words, by changing the length of the pitman (or changing the point where it is attached to the toggle, which is the same thing) the angle of the links becomes greater when the table has reached its limit of movement in one direction and less when the table has reached its limit of movement in the opposite direction. Hence in such constructions the speed of the table at a given point in its stroke varies as the length of the stroke is changed.

Having thus described my invention, what I claim is—

1. A transversely-inclined concentrating-table having a movement whose tendency is to carry the material longitudinally forward

toward the tail or foot of the table, said table being provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length for the purpose specified, the table having a smooth, plain, or unriffled portion extending from the extremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue effected.

2. A transversely-inclined concentrating-table having a number of longitudinal riffles extending a portion of the table's length from the head toward the foot, said riffles being of unequal length, the uppermost being the shortest while the other riffles increase in length from the upper edge to the lower edge of the table, the table having a plain or unriffled portion lying at the extremities of the riffles and adapted to receive the material caught by the riffles.

3. The combination of a transversely-inclined concentrating-table having a number of longitudinal riffles of unequal length extending from the head toward the tail of the table, said riffles increasing in length from the upper toward the lower edge of the table, said table being provided with a plain or unriffled portion at the extremities of the riffles, and means for imparting to the table a longitudinally-reciprocating movement comprising a toggle, an operating-pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the head of the table.

4. The combination of a transversely-inclined concentrating-table having a number of longitudinal riffles extending from the head toward the foot of the table, the table being provided with a plain or unriffled portion located at the extremities of the riffles, and means for imparting to the table a longitudinal reciprocating movement comprising a toggle-joint, an operating-pitman and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable roller adapted to engage a keeper carried by the table.

5. The combination of a transversely-inclined concentrating-table having a series of longitudinal riffles extending from the head toward the foot of the table, the table being provided with a plain or unriffled portion extending from the riffle extremities to the foot of the table, and means for imparting to the table a longitudinally-reciprocating movement, said means comprising a toggle-joint, an operating-pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with an adjustable roller, said roller being mounted on a block adjustably attached to the lever.

6. The combination of a transversely-inclined concentrating-table having a number of longitudinal riffles extending from the head toward the tail of the table, the table being provided with a plain or unriffled portion located at the extremities of the riffles, and means for imparting to the table a longitudinally-reciprocating movement comprising a toggle-joint, an operating-pitman, and a lever, one link of the toggle engaging one arm of the lever, while the other arm of the lever is connected with the table and provided with a vertical slot, and a block held in place by a bolt passing through the slot and carrying an antifrictional roller engaging a keeper on the table.

7. The combination of a transversely-inclined concentrating-table having a series of riffles extending longitudinally from the head toward the tail of the table, said riffles being of unequal length, the uppermost being the shortest and the riffles increasing in length from the upper to the lower edge of the table, the table being provided with a plain or unriffled portion of suitable area located at the extremities of the riffles, means for feeding the material to the upper portion of the table's head, means for discharging water on the upper edge of the table, and suitable means for imparting to the table a longitudinally-reciprocating movement of a character adapted to move the material from the head toward the tail of the table.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR R. WILFLEY.

Witnesses:

ALFRED J. O'BRIEN.

G. J. ROLLANDET.

United States

Circuit Court of Appeals

For the Ninth Circuit.

THE DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation, AND THE ARIZONA COPPER COMPANY, a Corporation, *Defendants-Appellants,* vs. THE MINE AND SMELTER SUPPLY COMPANY, a Corporation, *Complainant-Appellee.*	No. 2291.

Appeal from the District Court of the United States for the District of Arizona.

Brief for the Appellee

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors for Complainant-Appellee.

Statement.

EXHIBITS EXPLAINED.

A large number of paper exhibits, drawings and photographs were introduced into the record, in connection with the depositions taken in support of the issues, which together with a number of physical exhibits, and a bound volume, entitled "Book of Complainant's Paper Exhibits, Drawings and Photographs," containing reproductions of said paper exhibits, etc., arranged in order, have been transmitted to this Court.

For the convenience of the Court, in referring to exhibits other than physical exhibits, we will refer to the pages of said book of exhibits, upon which the same will be found, designating the same as "Ex. R." All other references will be to pages of the official printed record on file and will be designated as "R."

The claims of the Wilfley patent in suit (Nos. 1, 2 and 7) appertain wholly to the concentrating surface or deck of the ore concentrating table of the patent.

The following Complainant's exhibits illustrate the precise construction of the drawing (Fig. 3) of the Wilfley patent, wherein what are called Z-bar riffles are illustrated, referred to in the specification of the patent as "*an* embodiment" of the invention, viz: Nos. 4 (page 4); 77 and 77-A (pages 473-4); 94 and 94-A (pages 537-8); 95 and 95-A (pages 541-2); 96 and 96-A (pages 545-6); 97 and 97-A (pages 549-50); 98 and 98-A (pages 553-4), of Ex. R., and Exhibit Model No. 65.

The following Complainant's exhibits illustrate the form of construction practiced by Complainant commercially, having tapered riffles, viz:

Nos. 1 (page 1); 2 (page 2); 66 (model), and photograph exhibits Nos. 8 (page 13); 85 and 85-A (pages 505-6); 86, 87 and 86-87-A (pages 509-12); 88 and 88-A (pages 515-16); 89 and 89-A (pages 519-20); 90 and 90-A (pages 523-4); 91 and 91-A (pages 527-8); and 92 and 92-A (pages 531-2), Ex. R.

The following Complainant's exhibits illustrate defendants' construction, which is alleged to infringe, viz:

Nos. 5 (page 11); 6 (model Deister Table No. 2); 7 (Combination Model); 104 and 104-A (pages 571-2); 105 and 105-A (pages 575-6); 106 and 106-A (pages 579-80); 107 and 107-A (pages 583-4); 108 and 108-A (pages 587-8); 109 and 109-A (pages 591-2); 113 (page 606); 68 (full sized Deister Table deck).

NATURE AND PURPOSE OF ORE CONCENTRATORS OF THE TYPE HERE INVOLVED.

Ore concentrators of the type here under consideration are intended to be used in the concentration, by the more or less complete separation of the valuable metallics from the waste or gangue with which it is associated in its natural state, of finely crushed pulps of ores containing such metallics and waste or gangue material, varying in size from about 1/20-inch in diameter to the finest particles, which are, by the process of crushing, to a very great extent, freed from each other, thus permitting their being dealt with in concentration and separation by the use of water currents on a vibrating con-

centrating surface in accordance with the sizes and specific gravities of the particles. The problem to be solved in this type of concentrators being as to how means should be provided for saving and separating the valuable particles from the waste particles, which, due to shape, size and gravity, are most difficult to disassociate, requiring repeated opportunity of selection and repeated subjection to a stratifying and washing action, while maintaining sufficient capacity to render the operation profitable.

The means most naturally effective in accomplishing the saving of the doubtful or evasive particles of valuable metals, is one which gives repeated opportunity of selection by repeated subjection to conditions which are most favorable to such selection, a repeated mechanical washing (or panning, it would be called, if done by hand use of the common device known as the miner's pan) by mechanical means of construction and adjustment of parts in combination.

At different times considerable strides have been made toward attaining such mechanical results, each step made to some extent disclosing and seeking to make available conditions which, when recognized and understood, were sought to be utilized and taken advantage of by subsequent experimenters and inventors, but it remained to Mr. Arthur R. Wilfley *to discover a principle and make a machine* which was *the first to perform new definite functions* and to so apply the same, taking definite and intelligent advantage of precedent conditions disclosed and taught by the prior art, as *to produce both*

increased efficiency and capacity in the practice of ore-dressing by its use. That machine is the machine of his patent in suit and the machine also of Complainant's commercial construction, which embodies the application in practice of Wilfley's said patented invention.

ISSUES INVOLVED AND COMPLAINANT'S POSITION AS TO SAME DEFINED.

The Defendants in the cases here on appeal, rest their defenses and seek to avoid infringement, on the assumption that the invention of the Wilfley patent in suit is *an extremely narrow improvement in an old art.* They allege in their answers that "such concentrators and concentrating tables had been made and patented and used in many *forms* before the said Arthur R. Wilfley made the invention or produced the apparatus described in said patent 590,675," and that inasmuch as the invention described and claimed "was for *a narrow and specific improvement in an old art,* said patent is to be *construed and limited accordingly,* and that it must be taken to apply only to *apparatus covered clearly and closely by its specifications and claims,* and that the Defendant has never owned or used any ore concentrators or concentrating tables covered by the claims of said patent *so construed and applied"* (pages 46-48 R.).

In their printed brief, filed in this Court, counsel for these Defendants assumes that the issues are limited "to the *configuration* upon the surfaces of the two tables" (page 8), based upon the assumption that the invention of the patent appertains only to improvement in the matter of "form" and "configuration" of what

has gone before. The matter of substance, of new principles applied and new functions performed by the machine of the invention as patented, is wholly ignored.

Complainant's contention is that the invention of the patent, represents a great advance in the art, that it discloses the application of principles, and the performance of functions never before applied in the art, and that whether we regard Wilfley as a "pioneer" or an "improver", he is a *leader* and not a *follower,* with respect to the combination of the structural elements which were the first to apply those principles and perform those functions, and that the claims of his patent are, therefore, entitled to an interpretation commensurate with the stride which he has made in the art, and with the margin of his invention.

Argument.

THE WILFLEY PATENT—INVENTION THEREOF OF PRIMARY CHARACTER AND ADVANCED STRIDE IN THE ART AND ENTITLED TO BE SO CONSTRUED.

We will first briefly outline our position stated in the above heading, and later elaborate thereon in considering the questions presented in their respective details.

We contend that the invention of the Wilfley patent in suit is a *primary invention,* which *performs a function or functions never performed by any earlier invention,* and that as such it covers the apparatus used by the Defendants.

> Walker on Patents, Sec. 354, pages 300-301 (3rd Ed.)

We are not seeking constructively to expand the claims of the Wilfley patent, but are *resisting a very narrow construction* of them, which would render the patent valueless, and we insist that—

> "That interpretation which sustains and vitalizes the grant * * * * should be preferred to that which strikes down and paralyzes it."
>
> Nat. Hollow B. B. Co. vs. Interchangeable B. B. Co., 106 Fed., 701;
> Walker on Patents, 169 (3rd Ed.)

It does not necessarily follow from the fact that the

claims of a patent describe *a specific form* of construction of a machine or part, that the inventor is limited to that *form,* but it depends upon his expressed intention, and *the scope of his actual invention.*

Kings' Co. R. & F. Co. vs. U. S. Cons. S. R. Co., 182 Fed., 59 (C. C. A., Ninth Circuit, 1910);

Andrews Wire and Iron Works vs. Wilson Mfg. Co., 199 Fed., 798 (Sept. 25, 1912).

"*Elements* in *combination* of a patent *should be read with reference both to the structure* AND THE FUNCTION GIVEN IN THE DESCRIPTION *of the invention*" and "FORM *is material* ONLY SO FAR AS IT IS ESSENTIAL TO THE OPERATION, OR INDISPENSABLE *by reason of the state of the art, to the novelty of the claim.*"

London Mach. Co. vs. Strickler, 195 Fed., 751 (C. C. A., Seventh Circuit, Jan. 2, 1912).

And:

"Where a claim includes a specific element in a specifically limited *form,* where *such limitation is not* REQUIRED *by the general terms of the patent,* or *by the state of the prior art,* the Court *may* construe the claim, nevertheless, *with a scope commensurate with the invention.*"

Metallic vs. Brown, 104 Fed., 345;

McCormick vs. Aultman, 69 Fed., 371;

Reece vs. Globe, 61 Fed., 958;

Devlin vs. Paynter, 64 Fed., 398;
Electric vs. LaRue, 139 U. S., 601.

Whether we adopt the designation "improvement" or "pioneer" for an invention is not material. The test is, "what advance in the art has been made?" What is the "margin of invention?"

Nat. Hollow B. B. Co. vs. Interchangeable B. B. Co., 106 Fed., 701;
Metallic Extraction Co. vs. Brown, 104 Fed., 345;
Brammer vs. Schroeder, 106 Fed., 918.

An "improver" may show a greater advance than a "pioneer".

McSherry vs. Dowagiac Co., 101 Fed., at page 722, citing Penfield vs. Chambers, 92 Fed., 639.

Mr. Wilfley's invention is primary because it performs a function NEVER PERFORMED BEFORE, and *which revolutionized the practice of ore concentration.*

A recent decision defines "a pioneer patent" as "one covering *a function never before performed,* a wholly novel device OR *one of such novelty* and *importance as to make* A DISTINCT STEP IN THE PROGRESS OF THE ART, as distinguished from a mere improvement or perfection of what has gone before."

Autopiano Co. vs. Amphion Piano Player Co., 186 Fed., 159 (C. C. A., 2nd Circuit, March 15, 1911).

We think the record shows that Mr. Wilfley's patent invention is more than a mere "improvement" of what went before, since "*it covers functions never before performed" in this art,* and *is* "one of such novelty and importance as to make *a distinct step in the progress of the art,* as disinguished from a mere improvement or perfection of what has gone before." And it, therefore, is a "pioneer" invention as defined in the case last cited, and *in considering the question of infringements of the claims of the patent in suit, they are entitled not only to broad and liberal construction, but to a wide range of equivalents.*

Dr. Richards, Professor of Metallurgy and Mining Engineering in the Massachusetts Institute of Technology, in referring to this invention of Wifley, says that he "considers that the Wilfley table was *a great advanced stride and initiated a new era in concentrators"* (page 143 R.). That his arrangement of riffles rendered the table "practically automatic"; that "Wilfley's invention increases the *capacity* very largely, and the *efficiency* * * *, and there became a demand for it in the concentrating mills. Its use spread all over the United States as well as abroad" (page 151 R.).

The witness Callow states that "the Wilfley table has covered the entire field of ore-dressing and is the predominating type of machine for the treatment of medium sized material," that it is *one of the most important inventions made in the mining industry* (page 181 R.); and that "all concentrating tables that have come out in competition with and to do the work of the Wilfley table have been patterned after the Wilfley in-

vention; *an embodiment of the Wilfley idea appears to be essential to efficiency and capacity.*" (Page 184 R.).

Patentee Wilfley says that his combination made the difference between paying or not paying (profit or loss) in the ores treated. (Page 167 R.).

The patent expert witness Hodges states that Wilfley was a leader, and his invention emphatically an advanced stride in the art of ore concentration; that all the art which is in anywise similar to his construction has originated since the Wilfley patent—none before it, and that Wilfley made a radical departure from his predecessors in the art. (Pages 233-4 R.).

The Defendants proceed upon the assumption that the patentee Wilfley sought to patent as his invention a peculiar and specialized *form* and disposition of riffles, *per se,* and a smooth surface of peculiar and specialized *form* or *configuration, per se,* as if the mode of cooperation of the two surfaces were not part of his claimed invention.

Whether these elements were old or new is immaterial.

> Niles Tool Works vs. Betts Co. (C. C.), 27 Fed., 301.

> "The *invention lies in the combination* and *not in the elements.* These several elements are brought into combination *to co-act in such a manner as to produce a new result,* or *a better result,* than had been before achieved."

> Beckwith vs. Malleable Iron Range Co., 174 Fed., 1001, 1007.

This distinction is clearly pointed out by the U. S. Supreme Court in Elizabeth vs. Pavement Co., 97 U. S., 126.

DISCLOSURES IN THE PRIOR ART, TAKEN ADVANTAGE OF AND MADE MORE EFFECTIVE BY THE WILFLEY INVENTION.

In order to best understand and appreciate the Wilfley patented invention, the practice thereof in Complainant's commercial construction, and the functional co-operation of its elements, which it is contended are being infringed by Defendants' concentrators, it is deemed expedient here to make reference to certain pertinent developments in the prior art, as applied to the type of ore concentrating tables having a surface to which was imparted a movement or vibration (produced by means of various mechanisms) and a transverse inclination over which was caused to flow a film or sheet of water distributed at the upper end or side of the inclined surface by means of which pulps being fed upon the upper or feed side, near the mechanism side or end, were acted upon by the impelling forces of the mechanism operating in one direction, and the carrying power of the water applied operating at right angles to the impelling mechanism.

Rittinger.

Herr von Rittinger, about 1867, disclosed and practiced this form of construction, using a smooth table-deck or concentrating surface, in the operation of which the material (pulps) fed upon the surface was impelled in one direction by a cam, spring and bumping post, the

table surface being inclined in a transverse direction and at right angles to the movement imparted, in which the result of the operation of the two forces is to cause *a diagonal arrangement of the material in diagonal bands,* the angle of the diagonal of travel depending upon the inclination of the table, and the bands being disposed in the order of the respective specific gravities of the constituents of the pulps.

Dr. Richards testified that he is familiar with the von Rittinger table; that it has no riffles on it, and lacks the automatic action which the Wilfley possesses; that Wilfley put his riffles on with the diagonal ending—*the advancing terminals,* and so added to the strength of the machine in getting an automatic control of the line of change of detention by such means (pages 143-4 R.).

Dr. Richards explains what he means by the control of the line of change of detention, which takes place along the diagonal line of *terminals* of the riffles of the Wilfley construction, where the quartz no longer can be detained upon the table except in minute quantities (pages 144-6 R.) as illustrated by Complainant's photograph Exhibit No. 8 (page 13, Ex. R.).

He says that the great advance made by Wilfley in his patent lay in the fact that he placed riffle cleats across the flow of water, and *that he terminated* these riffles by *advancing terminals, bringing each succeeding tip nearer to the concentrates discharge end of the table.* The whole set of *advancing tips forming a diagonal* on the surface of the table.

He illustrates by comparing operations in which he participated, of a table having no riffles on the surface

(except six at the feed side) which, so long as the table was fed with perfect evenness as to quantity, quality, size and composition of pulp and quantity of feed and wash water, seemed to be successful, but that by a variation in either of the factors named the work was ruined, the line of change of detention fluctuating so that the concentrates ran into the tailings box or the tailings into the concentrates box, and that to operate such a table with any success at all, it would have been necessary to stand by it, just as the driver of an automobile does, and to control the water, the feed, the slope of the table, etc., constantly in order to maintain that line, which would be impossible in a mill. That the table *must* be automatic; the table so operated he considered a failure.

That when the riffles of the Wilfley construction were replaced with *terminals advancing along a diagonal line* the table was restored to having a very perfect control by mechanical means of this line of change of detention, and the table *immediately became automatic,* requiring an attendant to visit it from time to time, but *practically automatic* (pages 148-51, R.).

On cross-examination Dr. Richards referring again to Complainant's photograph Exhibit No. 8, says, that the *ends* or *terminals* of the riffle cleats *toward the concentrates discharge* end IS THE ESSENTIAL EFFECTIVE PORTION in the operation of the Wilfley table * * * because it is the point at which the support of the gangue grains is removed and the flow of the wash water from that point on has sufficient force to prevent nearly the whole of the quartz or gangue from being detained on the surface of the table (page 159, R.).

The patentee Wilfley (at pages 168-70, R.) describes his experiments on smooth top tables of the von Rittinger type and the effect of his addition of riffles where the same were most effective and omitting riffle protection where their absence was desirable to attain the best efficiency and capacity, which finally developed the *diagonal termination of the riffles.* He operated a table with transverse inclination without riffles which developed the natural diagonal line—the co-efficient of the forces exerted by the mechanism and wash water, and then adopted the protecting surface (of riffle cleats) to one side of this diagonal line, and allowed the other to be exposed, giving a constantly stratifying and catching quality to one side and cleaning effect on the other side of this line of separation; also giving at all times the opportunity for a particle to retreat to the stratifying plane where it might be retained; that he discovered the value of the protection and support of a series of riffles *adjusted with reference to this diagonal line,* and the repeated washing action, which he describes in detail, and which is also described in the specification of his patent at lines 7 to 56, page 2 thereof (Complainant's Exhibit 4, page 8, Ex. R.), which he says was accomplished *by the advancing terminals of riffles without regard to any particular form* or *shape of riffle cleats.* In his specification he says: *"I do not limit the invention to any special construction of riffle"* (lines 64-6, page 2 Wilfley Patent, Ex. 4, page 4, Ex. R.).

He says that he made experiments in varying the direction of line of the diagonal terminals of the riffle cleats, and found that by such changes the riffles *con-*

trolled the diagonal line of separation of the material within a certain range; that with the smooth-top table of the von Rittinger type, the line of separation (between concentrates and tailings) is hard to control so as to save concentrates and reject tailings, the line varying materially in case of variations of water, quantity of mineral in the pulp and numerous other variations that necessarily occur in a mill, rendering it almost impossible to operate such a table in a practical way, even though one would stand at the controlling lever every moment of time and thus make a perfect line of separation, the work is not good.

The witness Callow says that the effect of the riffle cleats on the Wilfley table is to restrain or hold back the material in the line of motion; that *the effect of the diagonal arrangement of riffle terminals is the controlling* or *governing effect upon the line of separation between the gangue and the mineral products* within certain limits, *automatically controlling this line of separation on the table;* that this automatic control has contributed most to the use of the machine in practice. (Pages 181-2, R.).

Dr. Richards very graphically illustrates, by reference to a series of photographs and accompanying diagrams of tests and demonstrations of table operations conducted by him, just what he means by automatic control of the line of detention. For convenience, reference will be made to said exhibits as embodied in "Book of Complainant's Paper Exhibits, etc.," wherein the same are reproduced, the originals thereof having been duly

certified to and being in the files in this Court as previously stated.

On page 214 R., Dr. Richards says that Exhibit 69 (page 449, Ex. R.), shows the effect of irregular feed upon a table-deck devoid of riffles; on page 215, R., that Exhibits 70 and 71 (pages 451 and 453, Ex. R.), show that when perfectly and evenly fed, a satisfactory separation is possible, but that such evenness as to quality, quantity, etc., can not be counted upon in mill practice; that Exhibit 72 (page 455, Ex. R.), should be examined in connection with Exhibit 71, showing what happens if the amount of feed is changed from the rate of one ton per hour as shown in Exhibit 71, to one-half ton per hour as shown in Exhibit 72, in the latter case all the concentrate departing with the gangue over the tailing side of the table instead of over the concentrate end as in the case of Exhibit 71.

He then proceeds (pages 215-17, R), to illustrate the effect of placing riffle cleats upon the surface, the terminals of which advance diagonally in conformity with the Wilfley patent invention, by reference to Exhibits 73 and 74 (pages 457-461, Ex. R.), the conditions of operation being identical except as to quantity of feed, the first being fed at the rate of one-half ton per hour and the second at one ton per hour; in both cases, notwithstanding the rate of feed, the line of change of detention, or line of division between the zinc middling and the quartz tailing being exactly coincident with the diagonal line of advancing terminals of the riffles; that in comparing Exhibits 73 and 74 the additional half-ton fed to the latter has been disposed of by increasing the

width of the concentrate bands, and also increasing the width of the silica band. He then further illustrates the mechanical control of the diagonally advancing riffle tips (pages 217-19, R.), by materially changing the angles of the diagonal alignment thereof, as shown in Exhibits 75 and 76 (pages 465-70, Ex. R.), which show that all conditions of operation being identical, except as to such changes of alignment, the location of the advancing riffle-tips controls the location of the line of detention or separation between the middlings and gangue coincident therewith.

Referring (pages 218-19, R.) to Exhibit 77 (page 473, Ex. R.), which illustrates the table of Fig. 3 of the drawings of the Wilfley patent in suit, having Z-bar riffle cleats with diagonally advancing terminals, he says that this figure shows the control of the line of change of detention along the line of advancing terminals very perfectly accomplished.

The attention of the Court is specially directed to this photograph Exhibit 77 which also shows, photographically, the dropping down from riffle tip to advancing riffle tip along the diagonal terminals of the series of riffles, of the superimposed gangue containing particles of mineral, which are thus repeatedly subjected to the rewashing from advancing riffle tip to advancing riffle tip, as described in the specification of the patent, to which attention has been hereinbefore specifically directed.

Comparing (pages 219-21, R.) said Exhibit 77 with photograph Exhibits 78, 79 and 80 (pages 477-86, Ex. R.) he says that in the Exhibit 77 having the riffles with ad-

WHAT PATENTEE WILFLEY HAS DONE, AND THE FEATURE OR FUNCTION OF "MECHANICAL CONTROL" BY THE RIFFLES IN THE COMBINATION OF THE WILFLEY INVENTION, AND ITS IMPORTANCE.

It seems obvious that it is *the evasive particles of valuable metals* in the ore pulp, which all inventions and improvements in the art are most concerned in recovering, and in providing for the recovery thereof by means which develop sufficient capacity to render the operation profitable.

It has long been known that the finest particles of heavy metals, so fine as to be easily put in suspension in water by agitation, could be recovered and saved by delicate manipulation by hand, by repeated panning or washing in a miner's gold-pan, in the hands of a person skilled in the operation, but it is apparent that such a process could not be profitable in the saving of the baser metals, or the exceeding small percentage of precious metals frequently found in association with or included in its matrix of silica or other waste matter, or contained as included grains or particles therein. Mr. Wilfley has sought, and in his combination of the elements of his invention has attained mechanically a repeated panning action by a combination of mechanical means adjusted with definite regard to the natural location upon his concentrating surface of the evasive particles of metals, which it is desired shall be separated from their associated gangue or waste in the pulps which shall have

been crushed to a sufficient fineness to free them, so as to permit of their specific gravities being taken advantage of in the operation. The coarser and heavier metals cause little anxiety; they settle into the bottoms of the channels, between the riffle cleats and travel rapidly along, being impelled by the mechanism, and promptly assume an advanced position on the smooth surface of the table, considerably above and in advance of the riffle tips; the next lighter mineral below, etc., until we come to the evasive particles of metal, which cling to their association with the heaviest and most stubborn particles of the waste or gangue, and these particles are located in a diagonal zone which is the zone marked "C" on the smooth-top table surface illustrated by Complainant's photograph Exhibits Nos. 71 (page 453, Ex. R.); 80 (page 485, *Id.*); 73 (page 457, *Id.*); 77 (page 473, *Id.*); 85 (page 505, *Id.*); 97 (page 549, *Id.*); and various of the photograph exhibits. This doubtful material which seeks naturally this relation to the heavier minerals and the lighter gangues, is the material that is specially sought by Mr. Wilfley's invention *to be given a repeated opportunity of selection, to be washed or panned over and over again, by taking advantage of and controlling its naturally attained location on the surface.* It is here in this approximate location or position on the table where it can be dealt with most naturally and most effectively as Mr. Wilfley has demonstrated by his invention, and it is here, and upon and with respect to this doubtful and evasive material, that the specification-described functions of the riffled and smooth surfaces of the Wilfley patent are performed in his commercial construc-

tion and which is clearly elucidated in the specification of the patent, commencing at line 101, page 1 (pages 7 and 8, Ex. R.).

This patent-specified and described function of the machine of the Wilfley invention, of repeated washing by the repeated alternating obstruction and exposure of the material by the advancing riffle tips, is graphically illustrated by Complainant's photograph Exhibit No. 77 (page 473, Ex. R.), which illustrates the exact construction in detail of the specification and drawings of his patent.

There was something that Wilfley did by means of the structure of his patented invention, which, however, he did not describe in the specification of his patent. *He mechanically controlled the diagonal bands or zones of material and the line of separation between the particles desired to be recovered and saved and those which it is desired to reject,* to a practical and valuable extent by mechanical means which operate automatically—to an extent which substantially overcame the defects of the incomplete control which was theretofore available by hand adjustment and the constant attendance of the operator. *He so adjusted and disposed his riffles upon the table deck as to locate,* within a practical range, and *to maintain and hold the zone of doubtful material containing the particles which required the repeated opportunity for selection by the repeated washing described in the patent specification, in such a position upon the table-surface as to enable the same,* or more properly, we may say, *to compel the same to be subjected to such repeated washing as a continuous operation.*

But by the settled rules of the patent law, the fact that only the function of "repeated washing" is described in the patent specification, does not prevent the inventor (and his assigns) "from reaping the advantage of *any other function within the claims as properly construed, available without a modification of the machine which involves the use of further inventive faculty,* whether known to him, and omitted in the specifications without fraud, or not known to him."

Reece Button-Hole Mach. Co. vs. Globe Button-Hole Mach. Co., 61 Fed., 958, 966 (C. C. A., First Circuit, April 20, 1894);

Long vs. Pope Mfg. Co., 75 Fed., 835 (C. C. A., First Circuit, July 14, 1896);

Dunlap vs. Willbrandt Surgical Mfg. Co., 151 Fed., 223 (C. C. A., Eighth Circuit, November 30, 1906).

The rule is clear that ordinarily a patentee who is first to make an invention is entitled to his claim for all the uses and all the advantages which belong to it, so far as the new application does not itself involve further invention.

Roberts vs. Ryer, 91 U. S., 150, 157;
Stow vs. Chicago, 104 U. S., 547, 550;
Miller vs. Mfg. Co., 151 U. S., 186, 201;
Electric Co. vs. LaRue, 139 U. S., 601.

The foregoing valuable functions were accomplished by the very simple means of adjusting his riffles to terminate on a diagonal line, as illustrated in the patent, and

also in the commercial construction. These means are so very simple of construction as to the essential concentrating surface of the table, that a kindergarten pupil of average development could make a perfect sketch of it.

WILFLEY INVENTION NOVEL AND OF A BROAD AND MERITORIOUS CHARACTER.

Mr. Wilfley was the first to discover, design, construct and patent a mechanical combination, which was the first structure known to the art in which it is classified which performed the two functions of automatic mechanical control and repeated washing which has been particularly described and illustrated as we have shown, and that the same was effective in the accomplishment of greatly increased efficiency and capacity in the concentration of ores. It is not contended that concentration upon smooth surfaces was new at the time Wilfley applied for his patent in suit. Such surfaces were undoubtedly used long prior to the Rittinger invention, and the same is undoubtedly true of the use of riffles as used by miners in placer mining by the process known as sluicing. The distinctive feature of the Rittinger table was *motion.* The Rittinger table primarily solved the problem of *motion,* there was no step disclosed in that construction in solving the problem of development of the full efficiency and capacity of the *table top.* This is no problem for a mere mechanic to solve, from anything obvious in the Rittinger construction. It was for the *inventor* to solve.

There was nothing in the prior art which suggested

the Wilfley *adjustment* and *arrangement* of riffles; it was not *a riffle* that was required, nor *a smooth surface,* or, broadly speaking, *a co-operation of the two,* it was just *such* a co-operation of riffles and smooth surface as Mr. Wilfley invented and discloses, that solved the problem, and nothing but *a high order of invention* could develop and disclose it. The invention lies in the combination not in the elements.

> Beckwith vs. Malleable Iron Range Co., 174 Fed., 1007;
>
> Citing: Elizabeth vs. Pavement Co., 97 U. S., 126, 144.

There is nothing in the prior art which teaches or suggests the two new and valuable functions of the Wilfley patent structure, which we believe is conclusively shown by the record.

The Blatchly and Kustel paper invention and patent, the drawings of which appear on page 99 of appellants' brief, and the teachings of which are embodied in the construction illustrated by Complainant's photograph Exhibits 78 to 85, inclusive (pages 477-502, Ex. R.) discloses a futile attempt to improve the structure of Rittinger, but it does not develop or disclose or teach a construction which either anticipates the Wilfley mechanical construction or the performance of either of the valuable functions of the latter. Neither the Rittinger nor the Blatchly and Kustel disclosures suggest a solution of the problem solved by Wilfley, or helped one iota in that regard.

Nor does the Lampert patent (page 102, Appellants'

brief) anticipate, disclose, or teach anything of the kind, as has been judicially determined by Judge Welborn, in the U. S. District Court, Southern District of California, Southern Division, on March 12, 1912, in a case based upon the Lampert patent, and at least two other adjudications in cases in which Lampert was cited and considered.

The Wilfley patented table and construction represents a type of concentrating device new with him; his unaided stride in the art involved more than a mere change of design. It was invention of the highest order, and the recognition of its merits by the public, and the immediate repeated and continued efforts of later experimenters and inventors to make its distinctive and characteristic construction a basis for attempted patentable improvements, as evidenced by the numerous subsequent patents issued for claimed improvements, stamps it as *novel* and *patentable.*

The validity of the Wilfley patent in suit has been adjudicated in a suit in which the Rittinger, and Blatchly and Kustel, and Lampert patent disclosures were considered, and the claims 1, 2, and 7 thereof, which are here involved, *given a liberal construction.*

> Wilfley vs. Denver Engineering Works Co., 111 Fed., 760 (C. C., Dist. Colo., November 5, 1901).

The only patents introduced by Defendants in this record were introduced and examined in the case last cited.

That case involved alleged infringement in a con-

struction having *"physical"* riffles extending over the entire length of the table, but made shallower, *relatively* along a diagonal line corresponding to the diagonal terminals of the Wilfley patent. Appellants' counsel have inserted the drawings of the Cammett & Shepard construction involved in that case at page 112 of their brief.

Judge Riner, in the opinion in that case, says: "The prior art discloses no combination of the elements of the Wilfley patent, *in the way* which he describes * * * this *arrangement* was *new,* and the testimony clearly establishes, *useful and valuable."* He also says: "The *merit* consists of *being the first to make the* APPLICATION and *the first to show* HOW *it can be made,* and the first to show that there is utility in making it." He further says: "The minds of inventors and those interested in the art had been specifically directed to the question of the separation of the values from the gangue for many years prior to the Wilfley patent, yet neither the Defendants *nor anyone else* conceived the idea that this result *could be best accomplished* by subjecting the pulp upon the table to the *repeated interference of the riffles placed upon the table in the manner described in the patent,* and *at the same time* and *in the same manner protect the values lower down on the table from the cross-wash of the water laden with the waste from the riffles higher up"* (page 762), and that "the distinctive arrangement of the riffles upon this table has nothing to do with the strata which lies at the bottom of the head end channels, and which find their way across the table to the tailings (concentrates) box. The *primary function* of the table, as shown by the evidence, *is that which concerns the mid-*

dle strata, which are treated by the interposing of riffles under the surface adapted to receive the mineral, and sufficiently 'smooth, plain or unriffled' for the purpose set forth in such a way that the *values are caught and restratified, and directed again to the tail of the table.*" (Page 763.)

"Upon the withdrawal of the protection of the elevated riffles, the relative resistance of the specific gravities of the various strata cause them to take different positions *in diagonal bands,* in the same order as that in which they were superposed * * * and *it is the taking advantage of this diagonal arrangement, by the adjustment of the riffles, with reference thereto, that is new and valuable in the plaintiff's patent.*" (Page 763.)

And to accomplish "a new and useful result" within the meaning of the patent law, *it is not necessary that a result before unknown should be brought about,* but *it is sufficient if an old result is accomplished in a new and efficient way,* and, if the *value* and *effectiveness* of a machine *are substantially increased by a new combination of elements, such combination is patentable.*

St. Louis Street Flushing Mach. Co. vs. Am. Street Flushing Mach. Co., 156 Fed., 574 (C. C. A., October, 1907);
Krajewski vs. Pharr, 108 Fed., 519.

A new combination of old elements or devices whereby *an old product is attained in a more efficient and economical way,* may be protected by patent.

Am. Steel & Wire Co. vs. Dunning Wire & Fence Co., 160 Fed., 108 (C. C., Iowa, 1908).

A new combination with a new mode of operation, may be invention, even if all the parts thereof are old, and *even if the* FUNCTION *of the combination is old.* While a new combination of old elements *often appear simple,* where there was *a prior defect* which was *thereby overcome, and the new device was immediately recognized and went into exclusive and general use,* it is persuasive that *more than mechanical skill* was required in bringing together the elements in such a combination to each other as to bring about the success.

Eagle Wagon Works vs. Columbia Wagon Co., 181 Fed., 148 (C. C. E. D., Pa., Aug. 3, 1910).

The attention of the Court is called to the fact that there is no evidence in the case at bar that the *functions* of the Wilfley patented invention and construction are old. On the contrary, the record discloses that Wilfley was the first to conceive the function of his patent specification and the first to devise a construction, a machine which has been patented to him, which performs the functions which are shown in the record. The principles and functions of a machine are not patentable, but the machine which first applies the principles and performs the function is patentable, if it has utility and novelty.

Invention *consists of the device* of the patent and *not in the conception of the principle to be utilized.*

Sewall vs. Jones, 91 U. S., 171.

But the *conception* must precede the *adaptation* to practical use.

The mere citation of patents alleged to either anticipate or narrow the art, may in many instances, and in the case at bar, we contend, does strengthen Complainant's position by showing that the trade has sought and experimented in vain for what Patentee Wilfley finally accomplished.

Forsythe vs. Garlock, 142 Fed., 461, 463-4, (C. C. A., Nov. 5, 1905).

After all is said "Nature is the real, first and original inventor—man simply assembles and combines facts and applies them to beneficial uses," and when he has made such a combination and application as to "advance the useful arts" he is entitled to the fullest protection of the patent laws.

Patents granted under the laws of the United States, pursuant to the provisions of Article 1, Section 8 of the Federal Constitution, are *grants made in consideration of discoveries which* "promote the progress of science and useful arts," and are to be construed liberally so as to effect their real intent.

Bossert Electric Const'n Co. vs. Pratt Chuck Co., 179 Fed., 385 (C. C. A., N. Y., May 23, 1910).

"The *meaning of letters patent, like other grants* or written instruments, must be ascer-

tained by the language employed, *as applied to the subject-matter.*"

Krajewski vs. Pharr, *supra.*

We believe that the problem which Mr. Wilfley solved, and which baffled operators for thirty years, called for invention and ingenuity, and the success which it has attained and the recognition given by the public, stamp it as an invention, new, useful and patentable.

In none of the patents or publications introduced on behalf of Defendants in this case, have they disclosed or pointed out a single structure which performs either of the new and valuable functions, the performance of which in the Wilfley patented invention and in the Wilfley commercial construction as well, is demonstrated by the record and exhibits in this case. Nor have Defendants attempted to show a prior use of either the patent or commercial machine in any form, or the performance of the functions thereof by any similar or equivalent device, or any device combining similar or equivalent elements.

The main questions to be considered in the light of the evidence are:

First. What breadth or scope shall be given the claims of the Wilfley patent in suit, in view of the prior art and the advance made therein, the margin of invention, and in view of the action of the Patent Office in rejecting claims as originally presented and acquiescence of the applicant in such rejection.

Second. Whether or not, having due regard to the scope or breadth of construction and application to practice to which said claims are entitled, the structure or

machine of Defendants, complained of, infringes the claims 1, 2 and 7 of the patent in suit, or either one or more of them.

Thus are presented mixed questions of law and fact.

The first and most important *fact* to be determined is *whether or not Wilfley was a* LEADER or a FOLLOWER with respect to his patent invention? Has he made a valuable invention which marks an advanced stride in the art?

That fact having been resolved in the affirmative clearly entitles the claims of his patent to a construction broad enough to cover the embodiment of other *forms* of physical construction which apply the same principles and perform the same functions in substantially the same way and *a range of mechanical equivalents commensurate with the primary character of the invention,* unless the patentee has been limited to a narrow and specific form or forms by some action of the Patent Office.

Limitation of the Scope of the Claims of the Wilfley Patent by Proceedings in the Patent Office.

With the purpose in view of so narrowing and limiting the scope of the claims of the patent in suit, Defendants, in connection with the deposition of their patent expert witness Browne, introduced a certified copy of the file wrapper and contents of said patent (pages 248 and 265 to 306 inclusive, R.).

This exhibit shows that the *invention* of the subject-matter originally presented, is for a *combination* of elements.

The application shows that the structure of the patent as issued is identical with that described in the original specification as illustrated by the drawing (Fig. 3) accompanying the same, as is clearly apparent from the following (quoting from the original specification):

> "My invention * * * consists of the features hereinafter *described and claimed.* All of *which will be fully understood by reference to the accompanying* DRAWING *in which is* ILLUSTRATED AN *embodiment thereof.*"

"In the operation of *the* machine the material to be treated is discharged in the form of pulp upon the upper left-hand corner of the table (*see Fig. 3*)" and now *quoting from a portion of the original specification cancelled* and for which the substitution, giving greater detail, was made as stated:

> "These mineral particles are, however, gradually moving toward the tail of the table under the influence of the latter's movement imparted by the operating mechanism * * *. *Hence, when the mineral reaches* THE FREE EXTREMITY *of the uppermost riffle, it is, for a brief space of time,* SUBJECTED TO THE FREE OR UNRESTRAINED ACTION OF THE WATER *before passing to the next riffle below.* During this *space of time,* it is deprived of some gangue, which was also caught on the first riffle. The gangue once separated is carried downward by the water, while the mineral is caught by the next riffle and so on."

The foregoing is the part of the specification cancelled.

What we have quoted above describes the function which is more fully and in detail described in the amended specification as being performed by *the* machine, the features (smooth and riffled surfaces) of which are to be understood "by reference to the accompanying drawing of the table (see Fig. 3)." It described the subjection of the material when it reaches the ends of the riffles, for a brief space of time "*to the free or unrestrained action of the water before passing to the next riffle below,* during which brief space of time it is *washed, i. e.,* deprived of some gangue carried downward to the next riffle below and so on from riffle to riffle.

Unless there had been a space beyond these riffles there could have been no such action, and by incorporating an amendment to elaborate on that portion of the table it amounted simply to an amplification of what was expressed * * * and *what the drawing fully illustrated.*

Now as to the original claim 1, which was cancelled, which was, in part, as follows:

1. "*The* transversely inclined concentrating table *having* longitudinal riffles varying in length, etc.," not *a* table but *the* table. What table? The table described and illustrated in the drawing, "Fig. 3"—none other has been referred to. And none other was described or referred to in the specification, drawings or claims originally presented, and *the specification and claims as amended and the claims as allowed adhere to what was originally presented and claimed as applicant's invention, in all respects, though with greater amplification.*

There was no departure by applicant in any regard from what he originally presented and claimed, and *he strenuously adhered to and persisted in the description and illustration of and in prosecuting his claims for the construction which embodied the essence of his invention, and the application of the principles and performance of the new and useful functions which he had conceived and developed.*

As a matter of fact, the numeral 5 was employed originally and has been at all times used to designate the table (see line 32, page 1 of the specification), and the portion afterwards marked with *the letter A was part of the table 5 and in reality need not have been employed at all,* for really the numeral 5 includes it as it refers to the entire table and A simply refers to a portion of the table surface, and there is nothing at all significant in using a letter instead of a numeral. No change whatever was made in the drawing, which means *nothing was added and nothing was taken away by amendment.* Much latitude is given in the prosecution of an application for a patent and the Rules permit the amendment of one part of the application so long as it does not deviate from the disclosure of the other part. In other words, the specification may be entirely rewritten to correspond with what is shown in the drawings as originally filed, and the drawings may be amended to correspond with what was originally disclosed in the specification. That is all that was done. The added description is obviously a mere restatement and re-expression of the features and functions which belong to the table as disclosed.

As to the claims it is true all the original claims are shown to have been cancelled.

The first official action was dated April 19, 1897. It is a very interesting fact that *not one of the three patents referred to in the deposition of Mr. Browne* (page 249, R.) *were cited in this action by the examiner,* and that the amendments which form important parts of the patent as issued, were almost all made June 21, 1897, in response to this rejection of April 19, 1897.

The first official letter dated April 19, 1897, rejected original claim 1 on the prior patent of Gates, No. 415,999, November 26, 1889, referring, also, to the prior patent of Waitt No. 513,489, January 30, 1894.

As a matter of fact, neither of these patents show so much as a riffle. The patent to Gates shows a plurality of mitered troughs constituting a feeder and termed a feeder to the table. But these were not riffles. They are neither called riffles nor have they ascribed to them the functions of riffles, nor could they in any wise be construed to be riffles.

We mention these facts to show that *there was no reason for limiting the original claims nor do we understand that Mr. Wilfley sought to restrict his claims by amendment in view of these patents.* It is not uncommon to recast and restate claims without necessarily limiting them by any means. *In some respects claim 1 of the patent is positively broader than original claim 1 in the language employed,* as for instance, original claim 1 refers to the riffle nearest the upper edge of the table as the shortest and the one nearest the lower edge as being the longest. Claim 1 of the patent specifies that

the riffles vary in length *for the purpose specified,* which means to accomplish the function of the invention.

It is true that claim 1 of the patent introduces the co-operating element, namely, a smooth, plain or unriffled portion extending from the extremities of the riffles toward the tail of the table. But *some such element as this would have been necessarily implied in original claim 1 if it had been retained,* or *otherwise there would have been nothing to co-operate with the riffles set forth in that claim;* and it seems reasonable to assume that *this claim is restated in the language of the patent for this purpose, to express an operative combination of elements to co-act to produce the function of the patent.*

As to the qualifying expression "riffles varying in length *for the purpose specified*" introduced by amendment of August 17, 1897, this did follow after the official letter of July 29, 1897, in which for the first time the examiner cited the patent of *Blatchly and Kustel* against the first three claims, claim 5 and claim 11. But *this did not amount to an acknowledgment or an acquiescence as to Blatchly and Kustel being an anticipation,* for in the first place, we find the same expression in a slightly different form as a part of original claim 1, but which was originally omitted from claim 1 of the patent. In original claim 1 we have the expression, "Having longitudinal riffles varying in length." When claim 1 of the patent was inserted it was omitted, but by amendment it was added as we have pointed out. But the fact that the qualification was in original claim 1 as originally presented does not indicate that its introduction was necessitated by the citation of the Blatchly and Kustel

patent. Quite the contrary. *It indicates an attempt to describe the feature of* ADVANCING TERMINALS *which co-operated with another surface of the table for the purpose specified, namely, to perform the functions of the invention.*

All that Blatchly and Kustel can be said to have is two surfaces, one of which is riffled and the other without riffles. But *that was not and is not the Wilfley invention. It remained for Wilfley to discover the principle of the* ADVANCING TERMINALS DIAGONALLY ACROSS THE TABLE, *thereby utilizing two contrasting surfaces* with gradual withdrawal of protection and repeated catching and rewashing and retreatment of the doubtful and elusive grains at the terminals tips.

> "An amendment to an application for a patent adding new claims which do not involve a departure from the original *invention* as *described and shown in the specification* AND DRAWINGS *is within the applicant's right.*"
>
> American Steel Foundries vs. Wolff Truck Frame Co., 189 Fed., 601 (C. C. N. D., Ill., April 25, 1911; Kohlsatt, C. J.).

> "*Drawings* are a part of the specification of a patent, and for the purpose of ascertaining the sufficiency of the description of the invention, must be read with it."
>
> Brammer vs. Schroeder, C. C. A., 106 Fed., 918.

> "Where new specifications and claims are filed in which the invention is stated much more in detail, and with much fuller and more accurate language than before, this does not necessarily expand the original claims beyond the scope of the invention, *particularly where the original* DRAWINGS *and* SPECIFICATIONS SUGGEST *the claims finally made.*"
>
> Hobbs vs. Beach, 180 U. S., 383, 386, 397.

It is *obvious* here that both *the specification and drawings* as originally presented to the Patent Office *indicate the device, the function and mode of operation,* and anyone possessing common sense and mechanical skill in the art could construct and operate the machine described.

The Blatchly and Kustel patent (page 99, Appellant's brief), which called for a combination of a riffled surface and a smooth surface at the ends of the riffles, did not disclose a construction of structural elements in combination which performed, or which could be made to perform the functions of the riffles of the Wilfley patent, without a material change in the co-operation of the parts, which required the intelligent application of co-operative functions to a precedent condition, which is quite overlooked and ignored in the Blatchly and Kustel patent construction, and by anything that is disclosed or taught therein, and there is nothing disclosed or taught therein, either in construction or function, which is of the essence of the Wilfley patented construction.

The structure which performed *the primary func-*

tions, the functions performed for the first time in the history of the art, was patented to him just as he originally disclosed and claimed it.

> "A patent for a mechanical combination is not anticipated by a prior patent, which incidentally shows *a similar arrangement of parts,* where such arrangement was *not claimed nor designed to* PERFORM THE FUNCTION *for which it is designed and claimed in the second patent.*"
>
> "Where an applicant for a patent *persisted in the basic idea upon which he claimed invention, although amending his claim* from time to time after rejections by the examiner, etc.," but his claims are finally allowed, "on the broad ground that *such basic idea involved invention,* such *amendments did not limit the claim as finally allowed* to the precise construction therein described."
>
> Gray Telephone Pay Station Co. vs. Baird Mfg. Co., 174 Fed., 417 (C. C. A., Seventh Circuit, October 5, 1909).

Limitation of the Scope of the Wilfley Patent by the Language and Terminology of the Claims Construed in the Light of the Descriptions and Illustrations of the Specification and Drawings.

Defendants treat Wilfley as *a follower* and *not a leader* in the art to which his invention appertains, and insist upon a narrow and limited construction consistent

with that view, and their interpretation of the words "smooth, plain or unriffled" would imply the addition of the word *"absolutely"* as an adjective qualifying these words. On the other hand, we contend that *relativity* is inherent in the nature of the invention, and having in view the functions of the machine of the invention, the principles applied thereby, and the relation of the invention to commence and the art in its practical aspect, that the word "relatively" or the word "sufficiently" should be implied. The Defendants contend that we should be limited to the exact physical construction in detail of the specification and drawings of our patent in a limited and restricted sense, and to a limited and restricted definition of the phraseology of the claims and specification of the patent with respect to physical details of construction of the machine or machines of the patent—that the riffles should be of unequal length, the smooth surface literally and "absolutely" smooth and free from anything that *might be called* "riffles". All of which leaves entirely out of view the *functions* of the invention—*the new and effective functions and principles applied* by the *machine* of Wilfley's invention. On the other hand, we contend that the "smooth, plain or unriffled" surface of the machine of the patent must be *"smooth enough, plain enough or unriffled enough* to co-operate with these riffles of unequal length, which means unequal in length as to their terminal, *to accomplish the function required."*

In speaking of this surface (A of Fig. 3 of the patent drawing) Dr. Richards says: That it is not necessary to perform the functions of advancing terminals

of riffles terminating on a smooth surface that the smooth surface should have any definite *dimension* or *form,* only sufficiently smooth and large to accomplish the function described and that when the word "smooth" or "unriffled" is used in the art it would have the meaning "smooth enough" or "unriffled enough" for the performance of the function which it is calculated to perform. (Page 162, R.).

Mr. Glassbrook says that: As applied to the practice of ore dressing, he has never seen an absolutely smooth surface, and that so far as the function of riffling is concerned, a riffle need have no particular shape, and that on a Wilfley table what is called a smooth or unriffled surface has to be sufficiently rough to retard the downward passage of the relatively heavier particles of value to be saved; in the practical operation of the machine it is immaterial whether that surface is covered with a roughness such as represented by linoleum, or is a smoother surface made rough by scratches or slight elevations or depressions, in actual practice the conditions would be the same, it is *a relative proposition always.* (Pages 165-6, R.).

Patentee Wilfley says that in the use of a concentrating surface where corrugated rubber with grooves extending longitudinally was substituted for a linoleum surface, the corrugations merely retained the mineral and conveyed it to the end of the table, but the line of separation was along the riffle tips. (Page 179, R.).

Witness Hodges says that on this area the surface must necessarily be sufficiently rough to retain the values which are to be saved when they reach that portion

of the table, while at the same time it must be smooth enough to permit the lighter grains of valueless material to come under the dominating influence of the wash water. (Page 201, R.).

We think that we have successfully demonstrated to the Court in this case that *the Wilfley patented device, and the purposes for which it is used, do not require exactness in the construction of the parts, in order to effectively apply the principles and secure the performance of the functions which he was the first to discover, develop and construct a machine to accomplish, which is the machine of the patent in suit,* and that *there may be great variations in the elements or parts, yet the operation, as to mode and means, will remain substantially the same. All the elements being constructed* RELATIVELY *to the purposes for which they are intended to be used.*

We think the record in this case clearly discloses that the feature of "relativity" is inherent in the nature of Mr. Wilfley's invention, and in its effective application for the purposes for which it is intended, and that it is in no sense or particular bound or limited by any "poverty of expression" in the matter of description which might be attributed to the wording of either the claims or specifications of the patent.

> "The question is not one of nomenclature, but of mechanics, and relates not to the names given to the parts of the combination, but to the various functions they perform."

Carlson Motor & Truck Co. vs. Maxwell-Briscoe Motor Co., 197 Fed., 309 at 315 (C. C. A., May 6, 1912).

Among the primary rules for the construction of a contract (and the same is true of a patent, which is a contract), are these: The Court should put itself in the place of the parties at the time it is made, and *should read its terms in the light of the facts and circumstances which then surrounded them. When the intention of the parties is manifest it should control,* REGARDLESS OF INAPT EXPRESSIONS AND TECHNICAL RULES.

Nat. Hollow B. B. Co. vs. Interchangeable B. B. Co., 106 Fed., 701.

At the head end of the Wilfley patent table, where material is passing over suspended in the water, there are reasons for the presence of riffles, and the word "riffles" in the patent is used with reference to a riffle's common use, and the *functions* it performs. At the tail end, beyond the diagonal line, the *purpose* for which the surface is used, the *function* to be performed *is quite different.* The *object* or *purpose* of this surface is to *permit* the repeated washing of the material described from riffle tip to advancing riffle tip. Such a surface was described by Mr. Wilfley as "plain, smooth or unriffled," "adapted to receive the material." Can there be any doubt that the language so used by him, a man personally familiar with the miner's vernacular, and unfamiliar with the quibbling of technical patent experts and lawyers, carried the conception of a "surface *sufficiently smooth, plain* or *modified" for the purpose of*

applying the principle and performing the function which he so fully amplified in his specification, and claimed as new and his invention?

Any other construction means that Mr. Wilfley's patent is valueless—a mere change of the *degree* of smoothness, which it might be clearly obvious would not materially interfere with the effective operation of his combination, and the performance of the functions thereof could be practiced with impunity.

A literally "smooth" surface is an ideal, and not a reality; a "plain" surface is an ideal, and not a reality, and an "unriffled" surface is an ideal and not a reality, for it does not matter what the shape or size of a roughness or obstruction may be, it may be *called* a riffle.

Such a construction should not be given if it can fairly be construed otherwise.

Walker on Patents, 169 (3rd Ed.).

It is pre-eminently *a practical question,* and *not to be solved by the dictionary.*

Walker on Patents, 165 (3rd Ed.).

> *"Dictionary definitions should not be applied to words in claims if the patentee in and by his drawings and descriptions of parts and functions has clearly supplied his own dictionary."*

General Electric Co. vs. Richmond, etc. Co., C. C. A., 178 Fed., 84;

Chicago Woodenware Co. vs. Miller Ladder Co., C. C. A., 133 Fed., 541;

Adam vs. Folger, C. C. A., 120 Fed., 56;

London Mach. Co. vs. Strickler, C. C. A., 196 Fed., 751, 756.

If we are not to be confined to the ideal, where can the line be drawn?

Not at 1/1000 of an inch, not at 1/64, not at 1/32.

The rule which construes such words as "sharp," "tight" and "perfect," etc., to be "sufficiently so for the purpose," in view of the principle involved, and the functions to be performed, seems to us to be a reasonable and just rule. Such words like "smooth," "plain" and "unriffled" are in their nature "*relative*" in their import, and become especially so when used in connection with a subject-matter in which *relativity* is inherent.

As applied to the table surfaces which are here the subject of consideration, a change in the relative characteristic of a surface area, so that it ceases to be suited to "*the purpose set forth*" in the specification of the patent, would be such a change as to cause it to cease to be an infringement.

Such a rule gives us what is ours, and does not permit us to encroach upon the rights of the public.

We quote from some authorities which we would bring to the attention of the Court in this connection:

> "Taking the *words* in connection with the context and the specification (the only fair way

to consider them), they mean *sufficiently sharp for the purposes sought.*"

"No *word* can be selected to show *exactly how sharp* the teeth must be."

"The word *equi-distant* must, we think, *include any position* that is *sufficiently midway* TO ATTAIN THE PURPOSE OF THE INVENTION."

"Whether a term is used in an *exact or* only in an *approximate sense,* is to be determined by considering WHETHER EXACTNESS IS REQUIRED TO ACCOMPLISH THE RESULT TO BE ATTAINED."

Krajewski vs. Pharr, *supra.*

As to the use of the word "convex", no adjective used, held to mean *more or less* spherical in form.

Beckwith vs. Malleable Iron Range Co., C. C., 174 Fed., 1001, 1004-7.

It is not essential that "corrugations" shall possess the characteristics of regularity or symmetry, and interruptions of the corrugations by a distortion of the surface—the modification performing the functions of the patent, is a palpable evasion and infringement.

Long vs. Noye Mfg. Co., 192 Fed., 566, 569.

Counsel for Defendants seek to confine us to a *strict construction* and *exactness in reference to a use* which the testimony in this case as to what that use is plainly shows *does not require exactness.*

Again we quote:

"I think, however, the word "tight" as used in the claim, is to be construed in the light of his specification, as *meaning sufficiently tight to subserve the purposes to be accomplished.*"

Robinson vs. Sutter, 8 Fed., 830;
See discussion on page 882, *Id.*

"The specification contains the *words,* 'a *perfect* copper cylinder,' but this language must be taken in connection with the claim. * * * *It would be a narrow construction* to put upon the Adams patent to hold that it only covered a cast copper cylinder absolutely free from blow holes. Probably no such cylinder was ever made by any process. *It is a practical question.* The claim must be construed to mean a cast copper cylinder * * * that is *sufficiently perfect* to be used in the arts *for the purpose for which copper cylinders are used.*"

Adams vs. Bridgwater, 26 Fed., 327.

"What do the words 'the rotary disk-shaped Knife H, having a continuous cutting edge,' fairly import? *This language is to be read with reference to the purpose to be accomplished.*"

Sayre vs. Scott, 55 Fed., 971.

An instructive case, treating of the unimportance of the mere matter of *form* or *shape* of an element in combination, is the very recent one of Andrews Wire

and Iron Works vs. Wilson Mfg. Co., 199 Fed., 798, wherein *form* was held to give way to the *principle* involved in the invention, and where the claim described a structural element as "*formed* with V-shaped edges," it was held to cover a "U-shaped" structural element which applied the same *principle.*"

Van Valkenburgh, D. J., in Mine & Smelter Supply Co. vs. The Braeckel Concentrator Co., 197 Fed., 897, involving the patent here in suit, says:

> "This leads to a considerable discussion as to what is meant by the word '*smooth*' in the (Wilfley) patent in suit. The specification and claims show clearly that *that term was employed to distinguish one portion of the table from the riffled portion of its surface.* In claim 1 this section is described as 'a smooth, plain, or unriffled portion'; in claim 2, as 'plain or unriffled portion'; in claim 7, as 'a plain or unriffled portion' of suitable area located at the extremities of the riffles. Clearly, then, *the term is a* RELATIVE one. A riffle, as used in this art and described in the testimony, is a strip or cleat of wood or metal superimposed upon the surface of the table in such a manner as to afford a barrier or obstruction, *with the effect described.* The other portion of the table is one devoid of *such* riffles, *the degree of smoothness may be varied* as desired, *provided it may cooperate with the riffles aiding them to discharge their* FUNCTIONS."

In the case of Bresnahan vs. Trip Giant Co., 102 Fed., 902, the Court says:

> "Neither of the machines now before us is *automatic in the entire sense of the word.* * * * It follows that in this machine *the word 'automatically' is not used in such a strict sense that it may not yield* TO A JUST CONSTRUCTION of the claims * * * it may be applied * * * *to give full effect to the invention.*"

The object of the patent law is "to secure to inventors a monopoly of what they have actually invented or discovered," and it "ought not to be defeated by too strict construction" of the terms of the claims, which may be inartificially drawn.

> Austin vs. American, 121 Fed., 76;
> Topliff vs. Topliff, 145 U. S., 156;
> Sewall vs. Jones, 91 U. S., 171.

> "There is a constant tendency by those who seek to evade the claims of a patent to *dwell too much on* VERBAL *refinements,* and *not enough in the* REALITY *of* the *things* to which the *language* of the claim refers. This tendency must be avoided in order to do justice to inventors * * * mere verbal refinement must not be allowed to obscure the *real nature of the patented invention,* if it can be fairly gathered from the language of the claims."

> Robbins vs. American, 145 Fed., 923.

When the Court is convinced that a meritorious in-

vention has been made it should not permit infringers to evade the patent on narrow and technical grounds.

Cimiotti vs. American, 115 Fed., 498;
Mach. Co. vs. Murphy, 97 U. S., 120;
Cantrell vs. Walleck, 117 U. S., 689.

"If his invention is of a broad and meritorious character, such as to work a decided advance in the art, it will require something more than the use of reference letters in his claims to limit him to the *exact* form of device he has described."

Multer vs. Lodge, 77 Fed., 621.

"The claims and specifications of every patent must be read and construed in the light of a full knowledge of the state of the art when the patent was issued. A patent to the original inventor of a machine *which first performs a useful function* protects him against *all* machines that *perform the same function* by *equivalent mechanical devices,* etc."

Steratt vs. Excelsior, 61 Fed., 980.

It does not necessarily follow from the fact that the claims of a patent describe *a specific form* of construction of a machine or part, that the inventor is limited to that *form,* but it depends upon his expressed intention, and *the scope of his actual invention.*

Kings Co. R. & F. Co. vs. U. S. Cons. S. R. Co., 182 Fed., 59 (C. C. A., Cal., 1910).

When two constructions of a patent are permissible, the Court will adopt that which will give to an inventor the protection to which, under the law, he is entitled, and where the language employed in a patent is indefinite or ambiguous, it should be read in the light of the reader's knowledge of the prior art.

Malignam vs. Jasper Marsh Co., 180 Fed., 442 (C. C. Mass., 1910).

The prior art shows nothing to have been done toward exploiting and taking advantage of the diagonal arrangement of material as developed on the Rittinger table in 1867, until thirty years had elapsed, when Wilfley applied for his patent in suit.

There was nothing in the art which anticipated or suggested to the mechanic the device which Mr. Wilfley claimed as performing the *primary function,* and as we have previously stated, we think the record shows that Mr. Wilfley's patent invention is more than a mere "improvement" of what went before, since *"it covers functions never before performed" in this art,* and *is* "one of such novelty and importance as to make *a distinct step in the progress of the art,* as distinguished from a mere improvement or perfection of what has gone before." And it, therefore, is a "pioneer" invention as defined in Autopiano Co. vs. Amphion Piano Player Co., 186 Fed., 159, cited above, and *in considering the question of infringements of the claims of the patent in suit, they are entitled not only to broad and liberal construction, but to a wide range of equivalents for the device.*

INFRINGEMENT.

We now turn to the question of Defendants' alleged infringement of the claims 1, 2, and 7 of the Wilfley patent in suit.

The primary distinguishing functions of the Wilfley patent invention have been fully described and illustrated.

Defendants' structure is an infringement of the claims of the Wilfley patent because it performs the primary functions thereof in substantially the same way, and by substantially the same means.

Robinson on Patents, Secs. 893 and 894 and Notes.

Soon after the advent of the Wilfley invention and the value and utility thereof became manifest, due to its almost universal adoption in practice, experimenters and so-called inventors became active in their efforts to devise means for the piracy of the invention in order to compete with Wilfley's and Complainant's successful practice of it, resulting in the discovery that the newly conceived functions of and principles applied by the machine of the invention as discolsed in the patent could be appropriated and utilized by embodiment in machines in which modifications in degree and form of the elements of the invention were contained, in the hope that in the use thereof they might avoid infringement by securing adjudications of narrow and limited construction of the claims of the patent, limiting and restricting the patentee and his assigns to the identical form and detail of physical construction described and

illustrated in the specification and drawings of the patent, to the exclusion of all other modifications of form, degree and mechanical equivalents, in that regard entirely overlooking the primary character of the invention with respect to the functions first performed thereby.

The first to insist upon the right to embody such modified forms with respect to the elements of the Wilfley combination were Cammett and Shepard, who sought to avoid infringement while retaining the benefits of the valuable functions of the invention, by claiming to extend riffles throughout and from end to end of their tables, making their so-called riffles shallower, however, along substantially the diagonal line of the Wilfley construction, and from thence to the concentrate discharge end of the table. Judge Riner, however, held this modification to infringe in Wilfley vs. Denver Engineering Works Co., *et al., supra,* decided November 5, 1901.

For a number of years succeeding the rendition of the Riner decision, its conclusions were very generally acquiesced in, but it became more and more apparent that no machine was rendered capable of successful competition with the Wilfley invention unless it embodies a construction which made available the functions and applies the principles of that invention, whereupon others began to creep up to and finally ventured to cross the infringement line in such manner as to appropriate all there was of value—*the vitals* and the *essence* of the invention. Among others so seeking to so pirate and appropriate were The Braeckel Concentrator Co., of Jop-

lin, Missouri, and Emil Deister, and his corporation The Deister Concentrator Co., of Fort Wayne, Indiana, manufacturers and venders of the alleged infringing, so-called, Deister Concentrators involved in these cases.

The Deister Concentrators embody the same identical modifications, consisting of the shallowing of the riffles along a diagonal line, so as to retain the functions, the essence of the Wilfley invention, which were adjudicated by Judges Riner and Van Valkenburgh in the cases hereinbefore referred to, but, in addition thereto, the Deister construction here complained of dispenses with portions of the two characteristic areas of the machine of the Wilfley invention, which are found not to be essential to the performance of the functions and to constitute the essence of that invention. Reference to the opinion of Judge Van Valkenburgh will disclose that the so-called "Dunham" concentrator, by the disposition of a diagonal dam across the table, in a position corresponding with the head motion end of the Deister tables, also dispensed to a great degree with a corresponding non-essential area at the mechanism end of the table.

Reference to "Complainant's Exhibit No. 8, Photograph Wilfley Table in Operation" (page 13, Ex. R.), in connection with the testimony of witnesses from which we will now quote, discloses two normally inactive areas in the table of the Wilfley invention as manufactured (which would also be true of the table of the patent drawing, Fig. 3, page 6, Ex. R., as will clearly appear from the table of that identical form and detail of construction in normal operation as illustrated by

"Complainant's Exhibit Nos. 77 and 77-A," pages 473-474, Ex. R.).

In Complainant's Exhibit No. 8, it will be observed that the portion toward the mechanism end from the border line, BB, of the silica band is occupied by water denuded of all material except fine slimes, frequently referred to by the witnesses as "dirty water," "slime back water," etc., and that a very large portion of the area toward the concentrate discharge end of the table from the border line AA of the silica band is occupied by clean wash water.

Dr. Richards, referring to the space on Exhibit 8, between the lines BB and the mechanism end of the table states: that when the table is fed normally and the feed is free from slime or mud, that portion of the table simply carries off the excess of feed water and some of the excess of wash water, and has no other significance, and does not make that area an essential feature of the table; it is there to handle an overload in case of uneven feed, and is not essential to separation; that the purpose of the area AA is to convey the concentrates after they emerge from the ends of the riffles to the concentrates end; also to do a little final cleaning, and it also carries and directs the film of water from the wash water box. (Pages 159-60, R.).

That it is not necessary to the performance of the functions of the riffles of advancing terminals, that the smooth surface should have any definite dimension or form, only sufficiently smooth and large to accomplish the function described, removal of the upper concen-

trates corner and lower mechanism corner would not interfere with the performance of the functions of the diagonally terminating riffles (page 162, R.).

Witness Glassbrook says: The removal of the upper concentrates corner and substitution of a wash board at the extremities of the riffles, and the removal of the lower corner of the mechanism end of the Wilfley table would not interfere, or only to a very limited extent in degree, rather than function, with the efficiency and capacity and the effectiveness of the operative functions of the combination of advancing terminals with the smooth surface of the Wilfley table. (Pages 164-5, R.).

Patentee Wilfley says that in 90 per cent. of the concentration of the country, the Wilfley table might as well be cut off near the ends of the riffle tips; that all the surface necessary is only so much as is necessary to wash the material as it passes from the riffle tips, and that the area near the mechanism end may be dispensed with. (Pages 179-80, R.).

The Witness Callow testifies to the same effect. (Pages 182-3, R.).

The Witness Hodges also illustrates the non-essential character of these areas by reference to the Exhibit Model No. 7, B-D-W. (pages 190-91, R.).

We think, therefore, that it sufficiently appears from the expert testimony on the subject that the major portions of the two areas of the illustration of the Wilfley patent as well as of the commercial construction, are not essential to the co-action of the two characteristic surfaces in the effective performance of the functions of the patent, and that the fact that this is obvious is

sought to be taken advantage of in the piracy of the Wilfley invention complained of, in addition to the relative shallowing of the riffle cleats in advance of diagonal lines, so as to retain the benefits of the valuable functions of the patent in suit, while presenting a physical construction which is capable of descriptive terminology or language the import of which is evasive of the fact that the elements as actually embodied are only so modified in form, shape and degree as to retain all that is valuable to the patented invention, while *seeming to permit of limited dictionary definition evasive of the scope* of the invention, especially if the valuable functions are to be lost to view and the construction of the claims are to be measured by strict limitation to words and dictionary definitions.

The Embodiment of the Invention in Defendants' Construction and Use of Deister Ore Concentrating Tables.

Defendants' witnesses do not attempt to deny the presence of the functions of the patent in suit in the construction of these Deister tables. They seem to be content with an attempt to show that the low riffles and shallow channels at the concentrate discharge side of their tables are capable of performing some of the functions of riffles, that silica—waste material—can be seen passing over and across them, which is also true of the smooth surface A of the patent construction, as we shall show; that they catch hold and direct the course of travel of the heavier particles, which is also true of the smooth surface A of the patent construction, as we shall

show. It would be strange indeed if some silica would not be seen upon the corresponding cleaning-up surfaces, in view of the conceded fact that the finished product of the operation is *never a perfectly clean* product, and that there is *always some silica present,* which, being distinctively a clear white substance, can be seen by the naked eye in contrast with the dark—almost black—mineral values of the concentrates.

They also go to great trouble and pains to show an enrichment of the concentrates between the well marked and defined diagonal line of separation and the point of discharge of the finished product in the cleaning-up surface, which is also true with respect to the corresponding surface A of the patent construction, as we shall show. And *in addition we shall show the presence in Defendants' machines of both the valuable functions of the patent invention* which have been so amply described and illustrated in the record, and that *these functions are performed in substantially the same way by substantially the same means.*

Complainant's patent expert Witness Hodges, says:

> "Passing now to the Deister table, as shown in Complainant's Exhibit No. 5, etc. (page 11, Ex. R.), and Exhibit No. 6 model, (see also page 17, Defendants' Brief) the table as a whole is rhomboidal in shape or, when compared in a general way with the Wilfley table, *is composed of an area occupied by the essential working elements of the Wilfley table with the non-essential portions omitted or removed,*

as is well illustrated by Complainant's Exhibit No. 7, B-D-W (combination model) by removing Exhibit 7-A-W, corresponding to the portion marked A of the Wilfley patent in suit, and substituting therefor Complainant's Exhibit No. 7-A-D, at one end, and by removing the portion marked Complainant's Exhibit 7-E-W, *which is the least essential portion of the Wilfley riffles of the mechanism end of the table,* and substituting therefor Complainant's Exhibit No. 7-E-D.

In this way a table is produced which conforms more nearly to the natural diagonal banding, clearly illustrated in Complainant's Exhibit No. 8 (page 13, Ex. R.) photograph, Wilfley table in operation. On the upper edge of this Deister table there is located the feed box, and the wash water box instead of being in alignment with the pulp or feed box, is brought around in a position over the diagonal concentrates discharge area; so that it parallels, or substantially parallels, the flange or head part at the opposite or mechanism end of the table. Parallel riffle cleats extend from the flange or head part toward the concentrates discharge end, they being formed in three steps or levels, terminating along diagonal lines, the changes between which are indicated by the lines AA and BB on Complainant's Exhibit No. 5, drawing, so that *the channels at and near the concentrate end are very shallow,* and as testified

to by Mr. Glassbrook, about one thirty-second of an inch in depth on this portion of the table. Alternate riffles terminate a short distance back. By actual dimension it is two inches, and opposite the smooth, plain and unriffled area thus formed, outlets are made in the table for the concentrate, and back of these outlets the flanges are erected and spaces intervene between them, so that the water descending from the wash water box above upon the smooth surface beyond these flanges is deflected around the concentrates outlets upon the smooth, plain and unriffled areas on the table surface adjacent thereto, and for some distance back toward the mechanism end of the table. At intervals throughout the riffled surface of the table, and also at the tailings discharge end, higher riffle cleats are arranged, and these are numbered in the Exhibit No. 5, drawing, Deister table, as, 1, 10, 20 and 32, respectively. At the lower concentrates end of the table a division is made so that middlings may be taken off at a point between the concentrates outlet and the tailings side discharge of the table. The Deister table has some improved form of head motion whereby it is reciprocated in a direction lengthwise of the riffles and *the same transverse flow of water and pulps, and endwise motion and resultant settling, stratifying, conveying and banding is obviously present on this table, as I have fully described in connection with the Wil-*

fley patent and table when in operation, and I find the same main characteristics of relatively rough and smooth areas or riffled and relatively unriffled areas in this Deister table as exemplified by Exhibits 5 and 6, as in the Wilfley invention and table. There are differences from the Wilfley invention and table in the non-essentials rather than in the essentials; the essentials of the Wilfley invention and table being present in the Deister table as shown in these Exhibits 5 and 6. One of the differences is in the reduction of the plain, smooth and unriffled portion A of the Wilfley patent to a minimum by removing this corner of the table and terminating it along the diagonal line and a short distance beyond the concentrates outlets and swinging the wash water box from a position in line with the pulp box diagonally across this end of the table, but *without omitting or altering any function or essential characteristic of the Wilfley invention.* * * *

The inclined surface of the wash board of the Deister table as represented by Complainant's Exhibits Nos. 5 and 6, *is simply a portion of the so-called smooth, plain and unriffled surface of the Wilfley table reduced to a minimum with the same effect of washing back the lighter quartz and gangue, while permitting the concentrates to emerge from beneath and find their way to the outlet;* and the construction of this table is such that it would cause the formation

of the same unbroken bands, the adjustment of riffles being with reference to this object and this alone, *the riffles* preventing the bands from becoming disrupted when formed and *affording the same protection and gradual withdrawal of protection* and creating the same detention of silica up to the final line of demarcation beyond which the silica can not progress further on account of the side-wash of the water which holds and forces it back, but beneath and beyond which the concentrates travel, by reason of their greater specific gravity, which causes them to cling with greater tenacity to the table surface and causes them to progress as a result of the end motion of the table.

There is not only this relatively plain, smooth and unriffled surface practically surrounding the outlets for the concentrates, but also the slightly deflecting channels formed by the thirty-second of an inch thick terminals of the riffles extending a few inches back toward the mechanism end, which *presents a relatively smooth, plain and unriffled surface and a surface which has the function of relative smoothness;* or, in other words, *a surface which is smooth enough* to permit the unobstructed side wash of the water from the wash water box, and at the same time which must be *rough enough to facilitate and augment the clinging tendency of the heavier concentrates* to the table surface at the concentrates discharge end. This portion

of the table at the concentrates discharge end, where the terminals of the advancing riffles are located, would, in the operation of the table, be still smoother, and it would physically appear, owing to the fact that these shallow terminals fill up to their full capacity with concentrates as they pass over this portion of the table.

I find on this Deister table, No. 457, as represented by Complainant's Exhibits Nos. 5 and 6, *the same surface as disclosed in the Wilfley patent,* namely, *a riffled surface and an unriffled surface.* The riffles extend in the same direction and *they terminate along a diagonal line as in the Wilfley patent and construction, in a plain, smooth and unriffled surface,* or, in other words, a surface which is *smooth enough* to permit the transverse flow of wash water film there across, while, at the same time, it is *rough enough,* as in the Wilfley patent and construction, to retain, hold and support the concentrates while the water passes on over them and creates the final cleaning and separation. There is in effect the same end motion lengthwise of the riffle cleats, and the same feeds above the uppermost riffles and the location of the wash water is slightly shifted, namely, to a point nearer the diagonal terminals of the riffles. *So that, in this table, there is present the effective operative part of the Wilfley table with an elimination, so to speak, of portions which are not absolutely essential to the operation of concentra-*

tion under fairly satisfactory conditions. *The difference* between the Deister table and the Wilfley invention and construction, in a word, *is a difference in dimensions and proportions* rather than a difference in kind and operation.

Applying the test and comparison of these three claims with the construction of the Deister table as understood and as exemplified in Complainant's Exhibits Nos. 5 and 6, and taking the claims in their order:

First, in Claim 1, a transversely inclined concentrating table having a movement whose tendency is to carry the material longitudinally forward towards the tail or foot of the table. This description accords precisely with the construction here presented.

The second qualification of the claim, namely, the table provided with a number of riffles extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length for the purpose specified. *The purpose specified* is not only stated in the portion of the specification which I have hitherto quoted, but is summarized in the following language, commencing with line 43, page 2, of the specification, to-wit:

'A portion of the gangue—that is to say, the latter part thereof—passes over the riffles in succession from the shortest or uppermost to the longest or lowermost riffle. The mineral and heavier gangue are caught by the rif-

fles and finally separated on the smooth portion A of the table. This combination in the concentrating tables of riffles of varying length for catching the mineral and a smooth, plain or unriffled portion at the extremities of the riffles where the final separation is effected, through the action of the water, is believed to be entirely new in an apparatus of this class.'

'A riffle is the best means of catching mineral, while a smooth, plain or unriffled surface is the best for effecting the separation of the mineral from the gangue caught with the mineral by the riffles; the separation being effected by the action of the water.'

Referring now to the construction shown in Exhibits 4, 5 and 6, which represent the Deister table, I find the riffles called for by the claim extending longitudinally a portion of the distance from its head toward its foot, said riffles varying in length *for the purpose specified* —that is to say, *varying in length to perform the functions required of the terminals of the riffles, which function is the same and performed in the same way as in the Wilfley patent and construction.* The claim next recites a smooth, plain or unriffled portion extending from the extremities of the riffles toward the tail of the table, whereby the material as it leaves the riffles, is subjected to the action of the water on the smooth portion of the table and the final separation of the mineral from the gangue is ef-

fected. The construction on Defendants' table is apparently with reference to this same condition and function—that is to say, the surface at the concentrates end and at the terminals of the riffles must be sufficiently smooth to serve as a clinging surface and also to convey the wash water across the terminals of the riffles and over the bands of concentrates, while at the same time, the surface is not perfectly smooth, but, on the contrary, it is rough enough to hold the concentrates in their progressive travel, due to the motion of the table, over this portion of the table, just as set forth in the Wilfley patent and as practiced in the Wilfley invention. In other words, this effective working part of the Deister table answers the terms of this claim when considered in the light of the description as referred to in the language *for the purpose specified,* with all the fidelity which any construction, not an exact copy of the Wilfley patent and concentrator, could reasonably do.

Taking the second claim, it first recites 'A transversely inclined concentrating table having a number of longitudinal riffles extending a portion of the table's length from the head toward the foot. Second, said riffles being of unequal length, the uppermost being the shortest, while the other riffles increase in length from the upper edge to the lower edge of the table, the table having a plain or unriffled por-

tion lying at the extremities of the riffles and adapted to receive the material caught by the riffles.

When consideration is given for the fact, as has been testified to by different witnesses, that *the lower mechanism corner of the Wilfley table is not absolutely essential to the effective work of ore concentration on that table,* then it would seem a perfectly fair conclusion to reach that the variation in length must refer to an active, distinctly operative and essential portion of the riffles, which portion is the terminal ends of the riffles, as those are the ends where the effective final separation is accomplished and where the saving is effected of the doubtful grains, the saving or loss of which goes largely to make up the difference between gains and losses and actual saving in ore concentration. In other words, it seems a perfectly reasonable interpretation to place upon the language of this claim, in view of the specifications and the actual operation of the Wilfley table, that the reference made by the language is to the actively operative part of the riffles which continuously advance and terminate beyond those above and along a diagonal line; thus to all intents and purposes making the uppermost the shortest and the lowermost the longest, and the intermediate ones of correspondingly increasing length; and the terms of this claim, therefore, are to be found in the Deister construction.

Comparing the seventh claim with the Deister construction element by element, as previously stated, we find the transversely inclined concentrating table having a series of riffles extending longitudinally from the head toward the tail of the table, said riffles of unequal length, the uppermost being the shortest and the riffles increasing in length from the upper to the lower edge of the table, and the table provided with a plain or unriffled portion of suitable area, namely, a portion of sufficient smoothness to perform the function of a so-called plain and unriffled portion created at the extremities of the riffles. Also, there is means present for feeding the material to the upper portion of the table's edge, namely, the pulp box, and means for discharging the water on the upper edge of the table, namely, the wash water box, and suitable means for imparting to the table, namely, the head motion, a longitudinally reciprocating movement of a character adapted to move the material from the head toward the tail of the table, etc."

"Therefore, I repeat, and for the reasons which I have stated, the elements set forth in the claims 1, 2 and 7 of the patent in suit are present in the Deister table as is illustrated by model, Exhibit No. 6, and the drawing, Exhibit No. 5." (Pages 190-201, R.).

He describes "as actually physically smooth, or ap-

proximately so * * * all of that area between the lines marked DD and EE on Exhibit No. 5, drawing, Deister table," and that "on the entire surface under the water box defined by the lines CC and EE, the surface to all intents and purposes is smooth," and that "what Deister has done has been to reduce this area (A of the patent) to its minimum proportions", and that "Deister *quickly disposes of the concentrates after nothing further in the way of separation can be done with them,* and *Wilfley might have done the same*, the idea being to separate the values from the valueless, and after that has been accomplished *the manner of disposing of the separated product was entirely a secondary consideration,"* and that "we could even eliminate this more or less sharply sloping wash board except as the water conveyor, but we *still have a smooth surface or smooth area at the very end of the table; that where these channels are reduced to a depth of 1/32 of an inch, at this portion of the table, it is smooth enough to permit the transverse flow of wash water and create the final paring off and separation, and yet rough enough to permit the particles of mineral to cling and cleave with the required tenacity to maintain their position until they leave the table."*

Further: that the patentee in defining the smooth portion A of the patent "*was influenced in the choice of his words by the general characteristic of the surface of the table,* and that *he applied the term 'smooth, plain and unriffled'* to express a distinction between the surface of the table which was intended *to perform a certain work as contradistinguished from another por-*

tion of the surface intended *to do a different part of the work;"* and that *"what Mr. Deister did was to adopt the essentials, the vitals, of the Wilfley invention, and do away with the non-essentials, * * * he omitted no function of the Wilfley table, nor did he alter the functions,* he steadfastly adhered *to those features—the advancing terminals and an area at those terminals* SMOOTH ENOUGH *to accomplish what Wilfley's so-called* 'smooth, plain and unriffled' surface does." (Pages 202-4, R.).

Dr. Richards agrees with the Witness Hodges in all particulars, describing the operation of the Deister table in detail (pages 160-63, R.), and (on pages 226-231, R.) illustrates the same by reference to the photograph Exhibits 104 to 113 (pages 571-604, Ex. R.), and referring to the functions described in the specification of the Wilfley patent in suit, commencing on the next to the last line on page 1 and concluding on line 56 page 2 of the patent (pages 7 and 8, Ex. R.), and to the photograph Exhibit No. 77 (page 473, Ex. R.), illustrating the patent construction in operation, he says that exhibit illustrates the function (of the co-action of the riffle tips and smooth surface by repeated washing, etc.), described in that part of the specification that *"it shows the gangue with streaks of mineral contained therein passing from advancing riffle tip to advancing riffle tip below,* progressively down the ends of the diagonal riffles"; and that "these Exhibits 105 and 106 (of the Deister table in operation) *both disclose that action* * * * on the line AA or the first diagonal line of step-offs" and that "during the time of the conducting of the tests which are illustrated in these photographs *this action was* VERY

apparent to the eye along the line indicated in these photographs." (Pages 230-31, R.).

NOTE: Counsel request the Court to examine the original photograph Exhibits Nos. 77, 105 and 106, which show more distinctly the passage or dropping down of material from tip to tip of the riffles than do the printed record reproductions thereof.

Witness Callow, after describing the changes made in the Wilfley patent constructions, says: "The Deister construction embodies and includes the effective operative surface of the Wilfley concentrator construction practically in its entirety." (Pages 184-5, R.).

And the Witness Scobey in comparing the photograph Exhibits 77, Wilfley table and 105 and 106 Deister No. 2 tables in operation, finds the same function present along the diagonal line of step-offs AA. (Pages 211-12, R.).

Witness Bunce makes the same comparisons, and observations (page 232, R.).

We will now briefly refer to testimony and exhibits introduced into the record by Defendants, which we anticipate will be urged by counsel in avoidance of the infringements complained of. Counsel seem to have assumed that the difference in area of the surfaces of the respective constructions, the difference in weight; the alleged difference in cost of upkeep, and the alleged greater efficiency of the Deister tables (according to tests conducted by adverse witnesses) are material for the purpose of excusing and warranting the piracy and infringements complained of. We shall show by the authorities which we shall cite, that even conceding *all* that

is or may be claimed in these respects, it is quite immaterial to the issues here.

The principal part of the testimony taken on behalf of Defendants is devoted to showing the undoubted fact that silica passes out from the higher portions of the riffles of the Deister table onto the surface covered by the extremely shallow riffles toward the concentrate discharge end from the line B-B of the exhibits, this cumulation of testimony was introduced on the assumption that Mr. Hodges had been mistaken when he stated, as matter of opinion, before he had ever seen a Deister table in operation, that the separation was *commercially* completed at or approximately at the line B-B, which is true in the sense that the line of separation is maintained there in the practical operation of the table. *All of Defendants' witnesses so declare.* But all agree that a very considerable percentage of silica is carried beyond that line, in their practice, and even into the finished concentrates as they are deposited in the concentrates launders. In such case it would be most likely that particles of white silica would be seen with the naked eye passing over the top of the heavier minerals which occupy the shallow channels on that surface, but the same is true of the corresponding linoleum surface of the Wilfley patent construction, and the testimony is uniform and consistent on both sides that there is a continuous washing and cleaning-up on and across that surface, that is to say, the fine particles of silica that escape from the higher riffle ends onto that surface in both the Wilfley and the Deister construction, by reason of their lighter gravities, naturally find their place at the top of

the heavier mineral particles where, being subjected to the cross-flow of the wash water they are carried down the transverse slope or incline of the table, and that means exactly that they are carried back to the higher riffle tips, for *these* are *always below*—adown the slope of the incline—*to catch these particles* and to rewash by means of the co-acting function of the two surfaces. *Whatever of this silica is not eliminated* IN THIS WAY BY THE OPERATION OF THE FUNCTIONS OF THE WILFLEY PATENT, *is not eliminated at all,* but passes with the concentrates into the receptacle provided therefor, and these functions are operative at all times along at least three diagonal lines of detention provided in the Deister construction.

The fact is that just the same thing occurs in this regard on the corresponding surfaces of both tables.

Much pains has been taken by counsel for Defendants to demonstrate the fact which, is no doubt a fact, that there is an enrichment of the material as it travels from the ends of the higher riffles toward the concentrates discharge edge of the Deister table. This *could not be otherwise* either upon this surface and in these very shallow channels or upon the corresponding linoleum surface of the Wilfley table. *It* IS *the case with respent to* BOTH. *There is* NO DIFFERENCE *in that regard.* And why? Simply because on both these tables the impelling force of the movement of the tables causes the heavier particles of metallics to travel more rapidly in that direction, than do the lighter particles of waste, and the values therefore naturally take this advanced position on the concentrating surfaces, while the waste material is passing in another direction—down the in-

cline of the table. In other words, with respect to the heavier particles of value which are in more direct contact with the surface of the table, the endwise movement and friction dominate, while with respect to the lighter particles of silica and other waste products which are more or less in suspense in the cross-flowing wash water, the latter dominates, holding the same back toward the advancing riffle tips and in a position lower down on the incline.

This corresponding enrichment on the linoleum surface of the Wilfley table is clearly demonstrated by the photograph Exhibit and accompanying diagrams Nos. 99, 99-A; 100, 100-A; 101, 101-A (pages 557-66, Ex. R.); the diagram of the sampling of the material in the tests illustrated by these photograph exhibits and diagrams, "Complainant's Exhibit No. 102, Scobey Chart" (page 568, Ex. R.), shows the points at which the samples were taken, and that (this being a lead separation) there is a marked enrichment in lead as we progress from the riffle tips toward the concentrate discharge end of the table on the four lines, projected in alignment with the riffle cleats.

"Complainant's Exhibit No. 103, Assays of Samples, etc.," gives the same data in tabulated form (see testimony of Witness Scobey with regard to these exhibits, page 211, R.).

Whether an invention be a pioneer (in a broad sense), or, being of small importance, is ranked at the foot of the line, its commercial aspect should receive due consideration, and *it should be judged on its own merits;*

that is to say, *according to the advance it has made in novelty and utility beyond the former art.*

The statutory requirement that an applicant for a patent shall explain the best mode in which he has contemplated applying the *principle* of his invention (U. S. Rev. St., Sec. 4888) *does not preclude him from claiming any other mode which embodies his principle.*

Vrooman vs. Penhollow, 179 Fed., 296 (C. C. A., Sixth Circuit, May 4, 1910).

If the patentee's *ideas* are found in the construction and arrangement of the subsequent device, *no matter what may be its form, shape or appearance,* the parties making or using it are deemed appropriators of the patented invention.

Norton vs. Jensen, 49 Fed., 859;
Rogers vs. Merganthaler, 64 Fed., 799.

We believe that the best brief which we could submit to the Court on the substantive law of this case is contained in the opinion of Sanborn, J., in the case of Nat. Hollow B. B. Co. vs. Interchangeable B. B. Co., 106 Fed., 712. We urge the Court to read and consider that opinion carefully. The Wilfley patent, in view of the stride in the art made by his invention, is broader and is entitled to a broader and more liberal construction than the Hein patent there in suit.

We believe that we are entitled to have Defendants' constructions held to be mere "colorable evasions" of the *described means* of the Wilfley patent.

Defendants' constructions constitute infringements,

if the means come within the *description* of the Wilfley patent *properly construed, in view of the subject-matter of the invention,* or, if not within the *terms* of the patent properly construed, if they are *equivalent means, and,* wherein there is difference between Wilfley's patent construction and that of Defendants, the rule as to equivalents obtains.

Gray, etc., Co. vs. Baird Mfg. Co., 174 Fed., 417.

The Court will look through the disguises, however, ingenious, to see whether the inventive idea of the original patentee has been appropriated, and whether the Defendants' device contains the material features of the patent in suit, and *will declare infringement even when those features have been supplemented* and *modified* to such an extent that the Defendants may be entitled to a patent for the improvement.

Crown vs. Aluminum, 108 Fed., 845;
Clough vs. Mfg. Co., 106 U. S., 166, 178;
Consolidated Valve Co. vs. Crosby Valve Co., 113 U. S., 157;
Wilfley vs. Denver Engineering Works Co., *et al., supra.*

"The addition of something to what is shown by a patent does not avoid infringement *if the substance* of the invention is *taken* and the *principle* or *mode of operation retained.*"

Long vs. Noye Mfg. Co., 192 Fed., 566, 569.

All of the elements of the patent combination are employed by Defendants with substantial identity in their use, and *departure appears from the* LETTER *of the claims only, without substantial difference in the principle of operation.* The policy and rules of the patent law require that the patentee be *protected against such evasions of the* WORDING *of a claim* in *form* of non-essential details, *when the* SUBSTANCE *of the invention* is thus used, *and is unmistakably shown* in the specification and claims.

Columbia vs. Kokomo, 143 Fed., 116;
Hoyt vs. Horne, 145 U. S., 302;
International Mfg. Co. vs. Brammer Mfg. Co., 138 Fed., 396.

> "It is generally true, when a patentee describes a machine, and then claims it as described, that *he is understood to intend to claim,* and *does by law actually cover,* not only *the precise forms* he has *described,* but *all other forms which embody his invention,* it being a familiar rule, that, to *copy the principle* or *mode of operation described,* is an infringement, *although the copy should be totally unlike* the *original* in *form* or *proportions.*"

Winans vs. Denmead, 15 How., 330.

To constitute an infringement, the thing used by the Defendant must be such as to substantially embody the patentee's *mode of operation,* and thereby to attain *the same kind* of result as was reached by his invention. It

is not necessary that the Defendant should employ the plaintiff's invention *to as good an advantage* as *he employed it,* OR *that the result should be the same in* DEGREE; but it *must be of the same kind.*

Sewall vs. Jones, 91 U. S., 171;
Winans vs. Denmead, 15 How., 330.

Superiority or inferiority of utility in a Defendant's machine does not necessarily import non-infringement, *even where it can be traced to slight differences in mode of operation.*

Walker on Patents, Sec. 376 (3rd Ed.).

And when it is made to appear that Defendants' construction is a mere "colorable evasion" of that of Complainant, as disclosed by the drawings and specifications and embodied in the claims of and protected by his said letters patent, which, under the pretense of having embodied in their construction *some function in addition to those performed* by Complainant's construction, but *which nevertheless will be found, upon a critical examination, to have appropriated all that is of value* in Complainant's device, it will not be said, in aid of a narrow construction of Complainant's claims, that he has abandoned anything by reason of *any* proceeding in the course of the pendency of his application for letters patent for his invention.

Metallic Extraction Co. vs. Brown, 104 Fed., 345.

Changes in the *form of embodiment* DO NOT affect the identity of the invention.

Theberath vs. Rubber, etc. Co., 15 Fed. Rep., 246;
Smith vs. Nichols, 21 Wall., 112.

Brown, J., in Hobbs vs. Beach, 180 U. S., 383, says:

"The fact that the Horton device contains no mechanism for turning the strip into the inside of the corner merely indicates that it does not perform all the functions of the Beach patent. BUT IT IS NO LESS AN INFRINGEMENT *if* IT PERFORMS ITS PRIMARY FUNCTION in practically the same way. We are not concerned with the subordinate differences in the mechanism, *least of all with the different* NAMES *given by Horton to parts of his* machine similar to the corresponding parts in the Beach patent."

A patent claim impliedly covers all means, though neither expressed therein nor described in the patent specification, that *perform essentially the function of the specification means embraced by that claim in essentially the manner in which such claimed means performed it,* and *any means not described* in a patent claim, that is *equivalent to a described means* included thereby, is within the scope of the latter *as fully as though it had been described in the specification* and *expressed* in the claim.

Hall's Infringement Outline, pages 12-13, and cases cited in appendix.

Conceding that Mr. Wilfley in developing his invention used things which had been used before, yet it is

true that by the use of them *he added just the element, in the* ADJUSTMENT *of the combination,* which was *necessary* to make the whole a practical, valuable and economical apparatus. Just what all prior devices of this type lack, his device contains.

See:

Consolidated Valve Co. vs. Crosby Valve Co., 113 U. S., 157.

See, also:

In re Barbed Wire Patent, 143 U. S., 275;
Hobbs vs. Beach, 180 U. S., 383;
Nat. Hollow Brake B. Co. vs. Interchangeable B. B. Co., *supra.*
Krajewski vs. Pharr, *supra.*

In Consolidated Valve Co. vs. Crosby Valve Co., above cited, the Court remarks (page 179) that "When the ideas necessary to success are made known, and a structure embodying those ideas is given to the world, it is *easy for the skilled mechanic to vary the form by mechanism which is equivalent,* and therefore an infringement."

"Even if Complainant should be deemed not to be a *pioneer inventor* in the broad signification of the term, but *an improver only,* he is entitled to a reasonable range of equivalents, *measured by the advance he has made,* over older machines, and should not be limited to the specific *form* claimed and described in his patent."

McSherry Mfg. Co. vs. Dowagiac Mfg. Co., 101 Fed., 716.

Metallic Extraction Co. vs. Brown, 104 Fed., 345.

See, also:

Nat. Hollow B. B. Co. vs. Interchangeable B. B. Co., *supra.*

The question whether one thing is a mechanical equivalent for another is a question *of fact* depending on the testimony of experts, on an inspection of the machines, and *it is an inference* to be drawn from all the circumstances of the case, by considering whether the device used by the defendants, *is used for the same purposes,* performs the same functions, or is *applicable to the same object,* as the contrivance used by the patentee.

Foss vs. Herbert, 1 Bissell, 121; 2 Fisher, 31; 9 Fed. Cases, No. 4957, page 503.

"Every structure and combination which adopts the principle, the conditions which distinguish this combination from those which preceded it, * * * is a mechanical equivalent of the combination of this patent, and an infringement of the franchise its grants."

Nat. Hollow B. B. Co. vs. Interchangeable B. B. Co., *supra.*

Equivalent means need not, in order to be held such, be confined to mere matter of *form* in the construction, which varies from or is other than the means claimed in

the patent alleged to be infringed, but may also be held to be an equivalent of such means, *although it may operate in a detail way, other* and *better* than that which the patent describes as being the operation of the means claimed therein.

Hoyt vs. Horne, 145 U. S., 302, and cases there cited.

The test of *equivalency* with respect to a substituted element in a patented combination is *whether it operates* in *substantially the same way to produce substantially the same result in combination.*

Palmer vs. Jordan Mach. Co., 186 Fed., 496 (U. S. C. C., N. Y., 1911).

When an element in a patented combination *is improved,* and yet performs *the same functions* in *substantially the same way,* the use of the combination is an infringement.

Potter vs. Letward, 7 Fed., 215.

And even the *addition of a new function* by Defendant which would not alter the patented combination of Complainant, would not entitle Defendant to appropriate the invention of Complainant's patented invention.

Consolidated Fastener Co. vs. Hays, 100 Fed., 984;
Hoyt vs. Horne, *supra;*
Metallic Extraction Co. vs. Brown, *supra.*

Such alleged *added function* or *improvement* if con-

ceded *would not excuse the appropriation of all that is valuable in the Wilfley structure.*

Hoyt vs. Horne, *supra* (see page 309).

And, if it may be said and is a fact that the low riffles at the tail end of Defendants' No. 2 tables *perform the function claimed, of separating the various elements in the concentrates,* and that there is practical merit and advantage in their so doing, yet *the addition of such new function, which does not dispense with the action of Complainant's patented combinations,* will not entitle Defendant to appropriate his invention.

Consolidated Fastener Co. vs. Hays, *Supra.*

In a very recent decision of the U. S. Circuit Court of Appeals of the Third Circuit, rendered at the October Term, 1912, in what is known as the "Slime Filter Case" wherein the Moore process patent No. 764,486, was under consideration, the same being for a *process* that met a problem "to make *commercially* possible the recovery of a *minute amount of valuable metal from a large quantity of mud,*" the Court, in reversing the court below, said: "Viewed from a patent standpoint, the significance of a machine lies *not in its* FORM *but in* THE PRINCIPLE *on which it works,*" and that "The mere fact of the *output being carried off* as a dry product in Moore's case, to a dump heap, and in respondent's in a fluid form to a slime pit, does not go to the *substance* of the process. In the *essentials* that involve the invention, *the two are alike.*"

If the identity of means employed by Defendant in its concentrator tables should not be deemed to be virtually the patent-described means covered by the Complainant's letters patent in suit, and for *that* reason clearly infringements of the same, we crave the liberality of construction of Complainant's patented claims which we believe their primary character warrants, that the structural elements in combination embodied in Defendants' constructions be held to be EQUIVALENT to the construction shown by our patent.

Dr. Richards, who since some time in the 70's has devoted his life to the study and teaching of the art of ore dressing, and who has published the most exhaustive treatise on the subject, has pointed out wherein the combinations of means embodied in the machines of the Defendant co-act in substantially the same way in the application of the principles of the Wilfley patented machine, pointing out to the Court the identity of functions. He does not rest his testimony on matter of opinion, but upon actual observation of the machines in mill practice.

In the last analysis, Defendants' counsel rely upon the fact that a residuum of fine particles of gangue may be seen by the naked eye, being carried transversely down the table over the surface occupied by these slight structural elements—the extremely shallow cleats next the concentrate discharge of the Deister construction.

This is no doubt true. Mr. Browne has seen it. So

has every one seen it who has observed the table in operation. It is equally true with regard to the corresponding area of the tables of the Wilfley invention. It is true of all concentrating devices of this type, over the entire superficial area which may have material upon the surface which is susceptible of suspension in a water current. The testimony is uniform to the effect that on none of these devices is there an absolutely complete elimination of such particles from the finished product of the operation. The Defendants' machines are not different in this regard from the Complainant's machine.

It is a matter of slight importance after the main bulk of gangue is removed that these few fugitive particles of waste sand pass down across the table, and either pass off the tailing discharge side, or, what is just as likely, are caught in a channel lower down and carried into the concentrate. It is of great importance, however, that the heavier particles, comprising the values, should not, by being so carried down, encounter the danger of being carried off the tailings side; and it is frequently the case, in practice, that by proper adjustments of the machines an increased percentage of gangue is permitted to pass into the concentrates, rather than endanger the departure of particles of value, empounded by gangue matter, to pass into the tailings race. This is permissible up to a point where a penalty would be imposed in treatment charge in the process of smelting, to which the concentrates have yet to be subjected. It is the practice of many of the smelters to encourage the retention of a certain percentage of silica gangue, but to penalize by increased smelter charge for an excess of silica above a

percentage which may be desirable for the combination most favorable to fluxing in the smelting process.

It is significant that counsel for appellants, in their brief, concedes that it is necessary to have *very low* riffles on the area of the Deister table, lying between the diagonal line of the step-offs to the concentrates discharge edge, "low enough to let the fine sand go over, and at the same time, high enough to keep the concentrates back," and in that connection is made the significant admission of the "relativity" which we contend is inherent in the nature of the subject-matter of the Wilfley invention (pages 23-4, Appellants' brief).

A patent to Emil Deister, the designer of the Deister table, which is an exhibit in the cases (No. 895,169, August 4, 1908, pages 249-52, Ex. R.), the specification and drawings of which describe the "off-sets" in a series of riffle cleats, such as is used in the tables in Defendants' mills, describes the purpose for which the same are intended, as follows:

> "The off-sets of the riffles afford relief for the overlying gangue so that it tends to run downwardly toward the tailings discharge side of the table, while the underlying mineral portion of the pulp thus relieved of the overlying gangue, is *carried by the shallow extensions of the riffles* outward to the mineral launder, and *while being* DIRECTED *by said extensions,* is treated to the action of dressing water and thereby further relieved of gangue." (Lines 72 to 82, page 2, of specification.)

That is to say: After the operation of the advancing step-offs or "off-sets" has been utilized by the application of the distinctive principles and functions of the Wilfley invention, "the mineral portion of the pulp thus relieved of the overlying gangue is carried * * * outward to the mineral launder, and while being directed * * * is treated to the action of dressing water and thereby further relieved of gangue," which is just exactly what the corresponding linoleum surface of the Wilfley patent construction does, nothing more or different, except that the shallow channels of the Deister construction, to the extent of their combined holding capacity, give a definite *direction* to the progress of the finished product of the operation of the elements of the invention of Wilfley.

Counsel for Appellants have inserted in their brief (page 112) the drawings of the Cammett and Shepard patent No. 632,892, September 12, 1899. This patent was not introduced in the record in these cases.

In Wilfley vs. Denver Engineering Works Co., 111 Fed., 760, the construction alleged to infringe was in substantial conformity with the specification and drawings of said Cammett and Shepard patent in which the patentees specifically define the purpose of shoaling the riffles extending over the area corresponding with the "smooth, plain or unriffled" area of the Wilfley patent, as follows:

> *"We have discovered that the advantages of an unriffled portion toward the foot of the table may be retained and the disadvantages be gotten*

rid of BY CONTINUING THE RIFFLES AT A DIMINISHED HEIGHT *across such area to the foot of the table.* The reduced portion of such riffles *should be so low as not to interfere with the transverse flow of the wash water toward the tailings side of the table,* yet their presence is sufficient to exert a very decided guiding tendency to the heavier particles which constitute the values, etc." (Lines 30 to 65, page 1 of Specification.)

Cammett and Shepard were the first, so far as the art discloses, to step-off or shallow a series of riffles for the purposes specified, and hereinbefore quoted from the specification of their patent.

Judge Riner in Wilfley vs. Denver Engineering Works Co., *supra,* after defining "the feature of the Wilfley invention covered by his patent," says, "Do the shallow grooves in the Defendants' table (Cammett and Shepard), extending from the ends of the raised ribs or riffles to the end of the table, and through that portion of the table designated in the Wilfley patent as 'plain, smooth, or unriffled,' perform any other or different function? After a most careful study of this record, I have reached the conclusion that they do not." * * *

"The improvement in the Cammett over the Wilfley, if it is an improvement, *consists in directing and delivering,* by means of the grooves in that portion of the table designated as plain, smooth, or unriffled in the Wilfley patent, the concentrates into the receptacle provided therefor. It may be that the Cammett tables are an improvement upon the invention covered by the Wil-

fley patent in this respect, *but it still has all the essential elements of the best form of Wilfley's invention. It performs the same function in substantially the same way,* and, therefore, must be held to infringe."

Defendants insist that it is not proven that the (Wilfley) "machine patented was the first to perform a new and definite function in the practice of ore dressing, *so as to produce both increased efficiency and capacity.*"

Defendants insist not only that the inventor, Wilfley, was not a pioneer in the art, but also that his invention did not signalize a notable advance in the art. That such advance in the art is not proven.

It being admitted that the invention and machine of the Wilfley patent embodied a *new principle* (not a new combination of means for applying an old and well-known principle), Defendants would have the Court disregard the uncontroverted testimony of these witnesses of long experience in the operation of concentrating devices of all kinds, who *know* and positively *state* in the record that the invention did result in both increased efficiency and capacity, and that due to that fact the machines of the invention came into almost universal use throughout the world. The testimony of these witnesses in this regard was not merely theoretical. It is true that they did not testify as to the details of operation and the analyses of any of the undoubted thousands of comparative tests which were made of this invention *in comparison with the older machines and apparatus* in use *at the time* of and *prior to* the advent of the machine of the Wilfley invention, and which the latter supplanted, but they presumably had the knowledge acquired by the

experiences of such tests, and the Defendants' counsel did not undertake to test the basis of the knowledge of which they testified by either cross-examination or by the introduction of proofs based upon a comparison with anything which preceded or antedated the Wilfley invention.

The Defendants confined their tests to the comparison of an unchaperoned Wilfley machine with the *later* machine of the Defendants' construction in which they sought to embody all that the patent of the Wilfley invention taught, together with some alleged "improvements"—a machine constructed in the light of some ten years or more of experimentation with the new type of apparatus evolved and patented by Wilfley. They put the machine of the Wilfley patent "up against" itself "and then some," if indeed there be anything *added* in the Deister construction which makes for either greater efficiency or capacity, and ask the Court to *infer* from their tabulation of results introduced in the record, over proper objection of counsel, that the machine of the Wilfley invention and patent did not develop increased efficiency and capacity over what preceded it in the art and practice of ore dressing.

Testimony and exhibits of this character serve no purpose, as tending either to disprove the advance in the art by increase of efficiency and capacity attained by Wilfley's admitted embodiment of a new principle, or by way of avoidance of infringement.

Counsel for Defendants say that it is not *proven* that Wilfley, by the machine of his invention, was the

first to perform a new and definite function in the practice of ore dressing.

In that regard, we have not only the testimony of Dr. Richards, who has kept in touch with the art and literature as well as the practice of ore dressing, that the machine of the Wilfley invention *was the first,* and that at once upon the advent thereof its value was recognized not only by general adoption but also by the imitation of inventors who made some fifty-odd applications for letters patent on various claimed improved constructions embodying the disclosures of the invention, but we have the fact of the disclosure of the invention itself by Wilfley in the middle eighteen-nineties, and the prior art presented in the record in these cases, to which we are limited for the determination of the issues herein, and which show conclusively that at least so far as anything in the art is the subject of consideration in these cases, Wilfley *was* the *first* to patent a machine to embody the admitted new principle in the art.

Counsel for Defendants, quoting from the court's memorandum decision, seem to assume that the trial court based its conclusions upon the fact that the shallow riffles at the concentrate end of the alleged infringing tables deflected, or departed from the alignment of the higher diagonally reduced riffles. We do not understand from the language quoted, or from any part of said memorandum, that the Court rests its decision "mainly," or in any respect, upon "the deflection of the riffle terminals in the Deister table," and believe we are correct in assuming that the Court referred to "the deflected ends of the riffles" solely as *descriptive* of the

riffles which are located in a certain *position* with relation to the diagonally arranged riffles (as on the Wilfley table). Functionally, with respect to the co-action of the diagonally terminating higher riffles and the relative smoothness of the area covered by the very thin deflected riffles, there could be no material difference whether they were extended in alignment with the higher riffles, or were deflected either in an upward or downward direction.

Defendants ask a reversal with respect to the trial court's construction of the claims of the Wilfley patent in suit, and base their main argument upon the decision in Seabury vs. Johnson, 76 Fed., 456, the sulphur candle case. We make no controversy over the doctrine of that case, as applied to the facts, which widely differ from those of the case at bar.

Wilfley did not *limit* any of the elements in the combination of his invention by the *language* of his claims to any specific *shape or form* nor to any specific character of material to be used in the construction of *any* of the parts. He did not prescribe either wood, linoleum, metal or plate glass, for *any* of the parts, nor does his specification go so far as to *recommend* the use of any particular material as having advantages over any other material, or being "preferable." He might have limited himself by language embodied in the claims to an "absolutely" smooth surface, or to a surface of plate glass, or he might have specified burlap, for such a surface, or limited himself to a surface having no obstructions, scratches or irregularities thereon in excess of one one-hundredth of an inch above or below the general

plane, but he did none of those things. His claims do not cover the elements of his combination *per se,* either as to shape, form or material. His invention lies in the co-action of correlated elements in combination in the application of principles in the performance of certain effective functions, the application of which the record discloses was original with him.

The Defendants seek to have the claims of the Wilfley patent in suit construed as being much narrower than the invention presented, in order that they may, with impunity, appropriate the very essence of the invention, by limiting and confining Complainant to the *"configuration"* and details as to *form* of the machine and structural elements of the Wilfley patented invention as the same is shown in the drawings of the patent, because the inventor did not anticipate, describe and secure the allowance of claims specifically describing and covering every imaginable structural *"configuration"* and form by means of which the principles and functions of his machine might be applied in mill-practice. The patent law does not contemplate such a thing.

Among the cases cited is that of Railway Co. vs. Sayles, 97 U. S., 554,563, upon which is built the argument of counsel in support of their contention for such narrow construction.

This case lays down the proposition, as applied to *improvements* in an old art, that "The parties are entitled to the specific *improvement* they respectively invented, *provided* the later *does not* INCLUDE *the earlier."*

Just what we insist upon in the case at bar is, that if there be novelty and patentable invention in the De-

fendant's machines, the machines, nevertheless, *include* the invention of Wilfley, and that the Deister No. 2 includes the Wilfley invention.

The case referred to is founded on a patent for a confessedly narrow invention, "an improvement upon the car brake *now in general use*" (page 562).

The patent there in suit was for an improvement which only substituted a *lever* to perform almost precisely the same office performed by a *drum* in prior use, operating, by means of connecting rods, upon brakes, in nearly the same manner. The functions of a *lever* and a *drum* are practically identical, indeed a drum has been aptly called "a *continuous* lever."

This was a case wherein upon rejection of claims on an original application, after which no further action was taken for approximately five years, amendments were made enlarging the scope of the invention as originally presented, so as to cover other improvements which might have come into public use. There is no similarity to the case at bar in that regard.

A careful reading of the Sayles case renders it apparent that the Court was dealing with inventions which had to do with "*forms*", the improvements made consisted of "better forms" for doing the same thing. They involved no new functions, the application of no new principles.

The entire argument for narrow construction, contained in the brief of Defendants, is built up on this leading case, which, beyond doubt, is sound and logical as applied to inventions for slight improvements, limited to specific forms as to the structural elements, in which

no new principles are applied and no novel functio: performed.

We have been confronted by the same arguments, claimed to be supported by the same line of cases cited in the brief, in all the cases which have been filed in which infringement of the Wilfley patent has been charged, and it would, therefore, seem quite unnecessary to take up the cases cited one by one.

It is not true that the invention of the Wilfley patent inheres in an improved or better *form* for doing the same thing. It consists of securing better results, by applying new principles and new functions.

To adopt the contentions of Defendants' counsel would be to say to the inventor that because an art is old, attempts to further advance and improve it, to perfect and render practical, in a commercial aspect, what has not attained such perfection, will not be encouraged by the Courts, if others, perchance, have previously constructed and patented devices which disclose a wide range as to mere matters of "configuration" and "form."

We respectfully insist that under the law and the facts presented in the records in these cases the judgment of the trial Court should be sustained and affirmed.

Respectfully submitted,

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors for Complainant-Appellee.

IN THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT.

In Equity—No. 2291.

DETROIT COPPER MINING COMPANY OF ARIZONA and ARIZONA COPPER COMPANY,

Defendants-Appellants,

vs.

MINE AND SMELTER SUPPLY COMPANY,

Complainant-Appellee.

Brief for Appellants in Reply.

The statement of a few indisputable facts will show that the brief of counsel for the appellee is mainly made up of erroneous assertions and irrelevant cases. The appellants were engaged in the business of mining copper at Morenci, Arizona. They had been using Wilfley tables in their concentrating mills. The Deister table, then just being introduced in the mining country, was brought to their attention and they put a few of them into their mills. The Mine and Smelter Supply Company immediately brought suit against each company for infringement of the Wilfley patent, by use of the Deister machines. The District Court gave judgment for the plaintiff; the defendants appealed to this Court.

The charge of infringement in the bill is in restricted terms. It is said that the defendants were using ore concentrators "with certain riffles upon the tops or concentrating surfaces thereof, which in their

construction and adjustment substantially embodied and contained the improvements and invention patented to said Arthur R. Wilfley, as aforesaid, by said hereinbefore described letters patent No. 590,675, now owned by your orator as aforesaid, and especially the improvements covered and protected by the first, second and seventh claims of said Letters Patent." (Rec., p. 27, last 4 lines, to p. 28, first six lines.)

So that the only question presented here is whether or no the Deister table infringes claims 1, 2 and 7 of the Wilfley patent, or either of them, in respect to the *form and arrangement of riffles on its concentrating surface.* This question must be settled, of course, by reference to the claims of the Wilfley patent. The contention of the appellants is that they are to be taken in the plain, natural, ordinary sense of the words used, read in connection with Fig. 3 of the patent, which shows the deck of the table. The contention of the appellee is that they are to be taken in some much wider sense. In support of that contention counsel for the appellee make what seem to us to be very extravagant claims of excellence in the Wilfley table. We quote the following samples of them, including all the italics, with a reference to the page of the brief from which each of them is taken.

> "It remained to Mr. Arthur R. Wilfley *to discover a principle and make a machine* which was *the first to perform new definite functions* and to so apply the same, taking definite and intelligent advantage of precedent conditions disclosed and taught by the prior art, as *to produce both increased efficiency and capacity* in the

practice of ore-dressing by its use." (Pages 5 and 6.)

"Complainant's contention is that the invention of the patent represents a great advance in the art, that it discloses the application of principles, and the performance of functions never before applied in the art, and that whether we regard Wilfley as a 'pioneer' or an 'improver,' he is a *leader* and not a *follower,* with respect to the combination of the structural elements which were the first to apply those principles and perform those functions, and that the claims of his patent are, therefore, entitled to an interpretation commensurate with the stride which he has made in the art, and with the margin of his invention." (Page 7.)

"We contend that the invention of the Wilfley patent in suit is a *primary invention,* which *performs a function or functions never performed by any earlier invention,* and that as such it covers the apparatus used by the Defendants." (Page 8.)

"Mr. Wilfley's invention is primary because it performs a function NEVER PERFORMED BEFORE, and *which revolutionized the practice of ore concentration."* (Page 10.)

"We think the record shows that Mr. Wilfley's patent invention is more than a mere 'improvement' of what went before, since *'It covers functions never before performed in this art,* and *is'* one of such novelty and importance as to make a *distinct step in the progress of the art,* as distinguished from a mere improvement or perfection of what has gone before.' And it, therefore, is a 'pioneer' invention as defined in the case last cited, and *in considering the question of infringement of the claims of the patent in suit, they are entitled not only to broad and liberal construction, but to a wide range of equivalents."* (Page 11.)

"It remained for Wilfley to discover the principle of the ADVANCING TERMINALS DIAGONALLY

ACROSS THE TABLE, *thereby utilizing two contrasting surfaces* with gradual withdrawal of protection and repeated catching and rewashing and retreatment of the doubtful and elusive grains at the terminals tips." (Page 40.)

"He says that the great advance made by Wilfley in his patent lay in the fact that he placed riffle cleats across the flow of water, and *that he terminated* those riffles by *advancing terminals, bringing each succeeding tip nearer to the concentrates discharge end of the table.* The whole set *of advancing tips forming a diagonal* on the surface of the table." (Page 14.)

"That the *ends* or *terminals* of the riffle cleats *toward the concentrates discharge* end IS THE ESSENTIAL EFFECTIVE PORTION in the operation of the Wilfley table." (Page 15.)

"The foregoing valuable functions were accomplished by the very simple means of adjusting his riffles to terminate on a diagonal line, as illustrated in the patent, and also in the commercial construction. These means are so very simple of construction as to the essential concentrating surface of the table, that a kindergarten pupil of average development could make a perfect sketch of it." (Pages 25, 26.)

It is as clear, therefore, as words can make it that the claim of counsel is that the washing-up function in the Wilfley table along its diagonal line of riffle terminals is a feature of such supreme value that it entitles the appellee to apply the claims of the patent in some far-reaching sense—some sense other than the natural, ordinary meaning of the words, and that they believe that to succeed in doing this is vital to their case.

But this washing-up function is only an incident of the structure of the table. Whatever advantages

there are in it are secured to the patentee by the claims in suit for *the structure*. The function cannot be secured in any other way. Patents are granted for structures, and not for functions, or principles, or modes of operation. The cases are explicit on that point. See on this point the following in addition to those cited on pages 29 to 31 of our main brief:

Carnegie v. *Cambria,* 185 U. S. 403, 425.
Risdon v. *Medart,* 158 U. S. 68, 78, 79.
U. S. Raisins v. *Selma,* 195 Fed. 264.
Penn v. *Conroy,* 185 Fed. 511.
Expanded Metal Co. v. *General etc.,* 164 Fed. 849.
Dick v. *Henry,* 160 Fed. 690.

But the appellee is not content with ever so secure a monopoly of its own table with all its advantages. It wants to extend its monopoly to all other tables, and particularly to the Deister. For this purpose it alleges that Wilfley was a pioneer in the art. On page 8 counsel say: "We contend that the invention of the Wilfley patent in suit is a primary invention, which performs a function or functions never performed by any earlier invention, and that as such it covers the apparatus used by the defendants." This on the basis of its washing-up function. How extravagant! Pioneer inventions are not made in that way. In the greatest patent decision ever rendered —*Railway* v. *Sayles,* 97 U. S. 554— the Court defines a pioneer invention as follows: "If one inventor precedes all the rest and strikes out something which includes and underlies all that they produce, he

acquires a monopoly, and subjects them all to tribute."

In order to stand as a pioneer in the art, Wilfley must have been the *first to invent an ore concentrating table,* not merely the first to put a little improvement on it. That distinction was not his. The art is very old. In the answer of the Arizona Copper Co. in this case is a list of twenty-one ore concentrator patents, all prior to Wilfley, and running back as far as 1862. They were all put in evidence and all sent to the clerk here to be printed in the record, but by some mishap only nine were printed. A list of them, with the pages of the record where they are, is given on page 143 of our main brief. But they are enough to put Mr. Wilfley in the *improver* class.

On pages 5 and 6 of their brief counsel say: "It remained with Mr. Arthur R. Wilfley to discover a principle and make a machine which was the first to perform new definite functions, and to so apply the same, taking definite and intelligent advantage of precedent conditions, disclosed and taught by the prior art as to produce both increased efficiency and capacity in the practice of ore dressing by its use." "Increased efficiency and capacity." This calls for proof. What witnesses have testified that the Wilfley table is more economical in operation than any other—will do more work with less outlay for power? Not one. What witnesses have testified that it will recover more value from the same pulp than any other? Not one. Or turn out purer concentrates? Not one. But these are the points of excellence in an ore concentrator. One careful test is worth a hun-

dred windy asseverations. The appellee never made any, so far as appears. So counsel have to content themselves with big talk. But the appellants did. The only ground that counsel for the appellee have to stand on in this great case is the washing-up action which takes place along the diagonal line of riffle terminals on the Wilfley table. That is one way to do it. But it is not the only way nor the best way, as we have proved by tests applied to the Deister table. One of those tests is described with a cut reproducing one of the exhibits now on file in this court on pages 121 and 122 of our main brief, and another on pages 61 to 65. The latter test showed the Deister table to be far ahead on every point, the final comparison showing that the Deister *saved sixteen per cent more copper from the same pulp* than the Wilfley.

Right there, also, on pages 64 and 65 is a cut showing the relative dimensions of the concentrating surfaces of the Deister and Wilfley tables—the Deister 33.6 square feet, and the Wilfley 78 square feet. The Deister had less than half the concentrating surface and yet would do the same work. It was a perfect little giant in comparison. Mr. Hunt, the witness who produced these drawings and gave this testimony, was superintendent of the mill of the Detroit Copper Mining Co., and was perfectly familiar with both tables, having 38 Wilfley tables at work in the mill at that time. His testimony will be found on page 246 of the record, and the drawings are among the exhibits on file. Counsel on the other side sniff at these tests, but we regard them as highly important. The Wilfley patent was issued in 1897; these

tests were made in 1909—12 years later. The art had been advancing. The Deister table had just come out, and represented the latest and best development of the concentrating table. Counsel for the appellee were present when all the defendants' testimony was taken, and cross-examined the witnesses, and saw all the original exhibits when they were put in evidence. They could have pointed out any error in any of these tests, or could have made tests for themselves. Opportunity was offered to them to verify all the tests and make any others which they wished to, but they never did anything of that sort; never made any tests of their own table, much less any competitive tests with another.

All this is absolutely uncontradicted. So far as we can recall, the plaintiff below never undertook to contradict a word of the defendants' proofs. And, as the phrase goes, "There was a reason." The Wilfley table was indisputably outclassed at every point by the Deister. The Deister was the fruit of progress in the art—of inventive genius applied with infinite painstaking. On pages 16 to 24 of our main brief we have described the table minutely, pointing out its numerous novel and valuable features, and how it embodied elements of excellence found in no other table.

To come back now to the claims in suit. Counsel for the appellee are manifestly oppressed by the consciousness that it is impossible to sustain the decision below unless they can find some way to get rid of the limitations imposed by the plain words of their claims. And it is in a desperate effort to do that, that they

make the extraordinary statements about the Wilfley patent, which we have quoted. But it's no use. The washing up of the material which takes place along the diagonal line of riffle tips on the Wilfley table is not a point of any great merit, as we have shown. The Deister performs the same functions in another way, and better, as we have also shown. The Lampert table, shown and described on pages 140 and 141 of our main brief, performs the same functions in still another way, which is by spraying the material from a perforated pipe just as the concentrates leave the edge of the table. A moment's attention will show how it is done. Fig. 1 (the upper one) is a side view. T is a trough extending along the edge of the table into which the concentrates are delivered from the edge of the table over the bead or flange *a*. Above this part is a perforated pipe H, which sprinkles the material as it is leaving, so as to wash the remaining sands back. The same pipe is shown at H in Fig. 2 (which is a top view of the table) extending along the lower edge of it. This perforated pipe performs the function which is performed by the washboard in the Deister, across which a constant film of water flows to wash the sand out of the concentrates at the last minute.

No. There is no salvation in that function of the Wilfley table to which counsel cling like a shipwrecked sailor to a spar. And then what is left? Nothing, except to take the claims of the Wilfley patent just as they read, and in the same sense of the words as that in which they apply to the Wilfley table, and try them on the Deister table. They do not fit.

But hold! There are two men in the world who say they do. They are of that delectable class of citizens who have opinions for sale. They are prepared to furnish opinions on any side of any question. They are Robert H. Richards and Vernon E. Hodges, a pair of word-twisters to whom we have paid our respects in our main brief on pages 68 to 75. We do not wish to add anything to what we said there, except to recall in a sentence the sinuous path by which they found infringement. Richards said: "The riffled portion of the Wilfley table is a relatively rough surface as compared with the smooth portion, and the unriffled portion is a relatively smooth surface, so we will just substitute those words for the words used in the patent and its claims." "Amen!" said Hodges. Then they agreed that as one part of the Deister table—that part on the head motion side where the riffles are highest—was relatively rough, and that part next the concentrates discharge where the riffles were very low was relatively smooth, therefore the table infringed. How easy!

Beginning at page 34 and extending to 41 counsel take up the file-wrapper and devote 7 pages to an attempt to show that the Blatchly and Kustel patent was not a pertinent reference against the Wilfley application. We have discussed this subject on pages 131 to 139 in our main brief. The sum of it is that the applicant in the course of his application asked for claims in which nothing was said about any progressive shortening of the riffles from the head of the table

towards the foot. They were in that form as described in the specification when filed, and shown in that form in the drawing when it was filed, just as they appear in the patent. But the applicant proposed to leave out that limitation, and submitted claims which did not contain it. The examiner rejected those claims on Blatchly and Kustel, who showed a table just like Wilfley's, only the riffles were of equal length. The applicant could have contested the ruling of the examiner and appealed from his decision, but he did not do it. On the contrary, he acquiesced in the rejection and amended his claims accordingly to read as they now stand. That did him no harm, according to counsel's present contention, because it is on the washing-up action which takes place along the diagonal line of riffle terminals created by the unequal length of the riffles that he depends to save his case. At all events, having acquiesced in the rejection and amended the claims, he is estopped to put any construction on them contrary to the ruling of the office which he accepted.

The remainder of the brief for the appellee, aside from its citation of cases, is taken up with quotations from the testimony of experts, mainly that given by Richards and Hodges. We do not care to add anything further to what we have said in the preceding pages and in our main brief on that subject. But the cases—what shall we do with them? We never saw such a wilderness of authority before. We have counted them and make a total of seventy-three. A good many are cited over and over. It is difficult to eliminate the repetitions, although we have tried to

citations and on page 38

do it. But whatever the exact number is, the mass is overwhelming, not so much because there are so many as because they are in such disorder. The value of an authority depends on the parallelism of the case. To give the title of a case and a sentence from the opinion is not enough. What were the facts in the case decided? What were the questions before the Court? What was the Judge talking about? Until we have this information we cannot tell what the decision means. How is the Court to get that information in regard to all these cases? By reading them? That is impossible. It would be a task beyond the time and endurance of the Court. It is not impossible to counsel, although very burdensome. But suppose we do study and discuss them all in a brief. Can the Court take the time to read such an interminable brief as it will be? But it is that or nothing; to discuss them or to ignore them, which would hardly be respectful toward counsel or Court.

So we will start in, beginning nearest home with the case of *Kings Co. R. & F. Co.* v. *U. S. Consol. S. R. Co.,* 182 Fed. 59. This was a suit on a patent for a fruit-seeding machine. The patent was dated February 14, 1899, and is called in the opinion, "the Pettit patent." No machine had seeded raisins successfully before it came into use. A patent had been granted to one Crosby long before—July 31, 1866, for a raisin seeder, but it never went into use. Prior to the introduction of the Pettit machine all raisin-seeding was done by hand. The Court said, in the opinion on page 62:

"A third of a century passed between the date of that patent (Crosby's) and the date of the Pettit patent, and in that time the evidence is conclusive that raisin-seeding was done by hand, and that seeding by machinery was an unknown art. The Pettit machine was the first to go into use, and it went into very extensive and successful use."

Then on page 63 the Court proceeded as follows:

"We find no merit in the contention that by the specific language of claim 17 of the patent the Pettit invention is limited to the precise form there described, and that the patentee is limited to the identical plates shown in the patent drawings as stamped out of a single piece of metal. Section 4888 of the Revised Statutes requires that the inventor shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. This Statute was complied with in the present case. It does not necessarily follow, from the fact that the claim describes a specific form of construction, that the inventor shall be limited to that form. All depends on his expressed intention, and the scope of the actual invention which he has made. If his improvement is but a narrow one, or if he has used language such as clearly to show his intention to limit his invention to a particular form described, then he is held to the language of his claim, and limited to that specific form. But if his is a pioneer invention, or one of such merit as to be entitled to a liberal construction, the claims will not be thus limited even if couched in specific language, unless the inventor has also shown his positive intention to relinquish to the public all other forms in which his invention might be embodied."

This case is broadly distinguishable from the case before the Court in two particulars. First, it was a pioneer invention. There are no inventions to

which that name belongs with more fitness than those which for the first time substitute machinery for human hands at work. Men cut grass with a scythe and wheat with sickles for generations before the mowing machine and reaper were invented. They were great pioneer inventions. Women bent over their needles for centuries before Elias Howe emancipated them from that slavery by his sewing-machine. Men sewed buttons on shoes by hand until Morley showed them how to do it by machinery. And so on. The Pettit raisin seeder was not a machine of such world-wide utility, but it belonged to the same class.

What analogy is there between these inventions and that of the Wilfley table? The forty-niners did concentrate gold by hand, in pans in the Sacramento Valley in this state; but it was not the Wilfley table that delivered them from that toil. All concentrating tables are evolutions from the miner's pan, but Wilfley is a remote descendant of the common ancestor.

Moreover, and this is the second point to notice, the question of form was not material in the Pettit patent. The details of the mechanism could be varied in many ways without affecting the operativeness of the machine. But here form is everything. The bill charges infringement by the use on the Deister table of riffles "which in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the improvements and invention so patented to said Arthur R. Wilfley as aforesaid." And it is a narrow question of form,

too. Just the configuration of the surface of a concentrating table. The raisin-seeding case has no application here. It is in a different field.

Krajewski v. *Pharr,* 105 Fed. 519. This was a suit for infringement of a patent for a machine for breaking and cutting sugar-cane, to prepare it for pressing and crushing to extract the juice. It appears from the history of the prior art given in the opinion that it was formerly the practice to put the stalks of the cane stripped of their leaves through the crushing rolls without any preparatory chopping or bruising. This involved a loss of juice. "To secure better results," the Court say, "it was evident that the cane must have preliminary treatment." To meet this want, several inventors patented apparatus for the purpose. The Court on page 517 mentions one English and five United States patents. Krajewski's patent was held to be valid. It contained the following claim:

> "The combination of rollers provided externally with more or less sharp teeth having a zigzag trend in the direction of the length of the rollers, said teeth intermeshing but not coming in contact with each other, and when intermeshed being equidistant from each other, said rollers being geared together in order to maintain their relative positions toward each other, substantially as specified."

It was held by the Court that this language was sufficiently exact; that the words "more or less sharp," meant sharp enough for the purpose, and so with regard to the positions of the intermeshing teeth. But we have a very different case here. The

subject of the Wilfley patent is the ore concentrator described in the specification and shown by drawing in Fig. 3. It and its mode of operation are described with the most minute exactness. The solicitor who drafted it went to a world of trouble to make it plain. Its distinguishing feature is its combination of a group of riffles of progressively increasing length with an unriffled area adjoining their terminals. Reading the language in connection with the drawing, as we are bound to do, it is as clear as words and drawings can make anything that the unriffled portion is a *single space adjoining the terminals of all the riffles.*

We imagine that the application which counsel wish to make of the case is to the word "smooth" in the Wilfley patent. They stand on the ground that "smooth" means smooth enough for the purpose. But when we read the three words, "smooth, plain or unriffled," in connection with the drawing, it is manifest that they mean that one part of the table is to be occupied by riffles and the other part is to be devoid of riffles. Nothing can be clearer than that. And nothing can be clearer than the perfect correspondence of the words of claims 1, 2 and 7 with the table as so described. The Krajewski case does not help a bit.

Roberts v. *Ryer,* 91 U. S. 150. This was a suit upon a patent for improvement in refrigerators. The principal defense was prior invention by one Lyman. The respective theories and objects of the two inventors are fully discussed in the opinion. The fundamental feature of both inventions alike was to

use a current of air in circulation through the refrigerator. One of them had his mind on an *ascending* current of air, while the other had his mind on a *descending* current. One of them described his invention as consisting in the use of an *ascending* current, while the other described his as consisting in the use of a *descending* current. The court decided that the later patent was void; that it was "a mere carrying forward or new or more extended application of the original thought, a change only in form, proportions, or degree, doing substantially the same thing in the same way, by substantially the same means, with better results."

We fancy that counsel for the plaintiff are relying on the sentence quoted above in the citation of this case. It is a familiar proposition, and very good law where it is applicable. But it has no application here. In an ore concentrator the *form* of the concentrating surface is everything. In the Wilfley table the combination of the riffles of progressively increasing length with an unriffled portion adjoining their terminals is the whole invention. To change either element of the combination would be to make a new invention. If the question of validity were in dispute here the doctrine of the sentence quoted above might be applicable. But there is no controversy on that subject, and hence the principle stated has no application to the case.

Stow v. *Chicago,* 104 U. S. 547. This was a suit for infringement of four patents for improvements in street pavements. In the Supreme Court only two of the patents were relied on. They were held to be

invalid. As the question of validity is not in issue here the case would not appear on its face to be relevant. We fancy, however, that in reading the case counsel cast his eagle eye on these words on page 550: "A patentee who is the first to make an invention is entitled to his claim for all the uses and advantages which belong to it. . . . Whether he perceived and stated all its advantages is immaterial." This seems a little ambiguous. The first to make an invention. The patentee of every valid patent must necessarily have been the first to make *that invention.* Or the words might refer to the patentee of a pioneer invention, which seems more likely. We should suppose, however, that the words, taken in proper sense, would apply to any patent. Suppose a "use and advantage" should be discovered to-day for the Wilfley table hitherto unsuspected. Suppose it should be found that it could be used to treat rare earths, or sands, or cements, or grains, or cornmeal, or seeds. The owners of it would undoubtedly have a right to use it for any of those purposes. But such discovery would not affect the terms or force of the claims. The acceptance of those by the patentee is a dedication to the public so far as that patent is concerned of all uses and advantages not covered by their terms.

Western Electric Co. v. *La Rue,* 139 U. S. 601. This was a suit for infringement of a patent for improvement in telegraph keys. The improvement consisted in the substitution for the pivots and trunnions on which the key was carried of a flat strip of metal resting at each end on a post to the tops of which it was secured by screws or pivots and to the

center of which strip the lever of the key was fastened. The lever was thus supported in a horizontal position when not in use, and returned to that position by the torsion of the metallic strip when the pressure of the hand of the operator was removed.

The third claim of the patent, which was the only one considered, claimed the device as *a telegraph key,* which is the device used in sending telegrams. The defendant was making a telegraph *sounder,* which is a telegraph receiving instrument, containing a similar combination of elements. In respect to the uses of the two instruments the Court said on pages 605, 606:

> "The use of the combination is practically the same in both instances. There are the same elements of a lever fulcrumed upon a torsional spring, and adjusting screws for regulating the amplitude of the lever movement, and the retractile resistance of the torsional spring. They are used for purposes which differ principally in name. The key transmits the message; the sounder receives it. The material part of the key is a lever which completes and breaks an electric circuit; the sounder consists merely of a lever which completes and breaks a magnetic circuit. . . . Against this new and analogous use of his combination the patentee is as much entitled to protection as if the word 'sounder' had been expressly inserted in his claim."

This is a logical and just decision. But what relevance has it to this case? NONE.

Reece Button-Hole Mach. Co. v. *Globe Button-Hole Mach. Co.,* 61 Fed. 958. This was a suit for infringement of a patent for a machine for stitching button-holes. The apparatus comprised a frame and a

plate working in combination. The work could be accomplished by movement of the frame, the plate remaining stationary. In the claims in suit movement of the frame was called for. The question is thus stated by the Court on page 960, first paragraph: "The main question relates to the proposition that this patent can in no event cover a machine of which the frame is stationary and the plate moves. It grows out of the fact that in the specifications and claims are many expressions indicating that the frame moves and the plate is fixed." A few lines later the Court says that "nowhere throughout the patent is found any (expression) indicating that the frame might be fixed and the plate movable."

The Court held the invention to be one of a "fundamental character, highly meritorious, and one to be protected by a liberal construction," and reversed decree below which had been for the defendant. From what appears in the report it is to be inferred that the machine would do the work by movement of either the frame or the plate, the other remaining stationary. If so, the two modes of operation were clearly the equivalents of each other, and the invention being one of fundamental character, it was entitled to that range of equivalents. The machine involved is totally unlike a concentrating table, and the decision has no relevance to any question in this case.

Long v. *Pope Mfg. Co.*, 75 Fed. 835. This was a suit for infringement of a patent for an improved steering head for road vehicles. The decision was for the defendant. There is nothing in the decision which is applicable to the case before the Court except

this remark on page 839: "Of course, as usual with other instruments, this applies only when construction is needed, and not when the patent is clear on its face."

That is this case. The Wilfley patent is absolutely clear on its face. The table and its operations are described distinctly and the claims cover it perfectly.

Dunlap v. *Wilbrandt Surgical Mfg. Co.,* 151 Fed. 223. This was a suit for infringement of a patent for improvements in atomizers and vaporizers. The case is an authority for the defendant. The art was an old one, and the invention a narrow one, like that of Wilfley. On page 227 the Court said:

> "A patentee is entitled to every function his device will perform though he was ignorant of it when he procured his patent. But he secures no patent on the function, and a discovery of a new one in a patented device does not operate to enlarge or broaden the letter of his claim. It is the claim which measures the rights of the patentee, *and that which is not claimed is, so far as the particular patent is concerned, dedicated to the public.*"

Miller v. *Eagle Mfg. Co.,* 151 U. S. 186. This is the familiar wheeled cultivator case. Without burdening the Court with a recital of the facts and arguments which make the bulk of the long opinion by Justice JACKSON (who usually wrote short opinions), we will content ourselves with this quotation from page 207:

> "The range of equivalents depends upon the extent and nature of the invention. If the invention is broad or primary in its character, the range of equivalents will be correspondingly

broad under the liberal construction which the courts give to such inventions. The doctrine is well stated in *Morley Machine Co.* v. *Lancaster,* 129 U. S. 263, 273, where it is said: 'Where an invention is one of a primary character and the mechanical functions performed by the machine are, as a whole, entirely new, all subsequent machines which employ substantially the same means to accomplish the same result are infringements, although the subsequent machine may contain improvements in the separate mechanism which go to make up the machine.'

"Tested by this rule, and in view of the prior devices and the great variety of springs in use previous to the granting of his patent, Wright cannot be treated as a pioneer in the art. Neither can he, nor his assignee, be allowed to invoke the doctrine of equivalents, such as the courts extend to primary inventions, so as to include all forms of spring devices and adjustments which operate to perform the same function, or accomplish the same result."

No more can the plaintiff here be allowed to invoke the doctrine of equivalents so as to include forms of concentrating tables which operate to perform the same functions or accomplish the same result as the Wilfley.

Bossert Electric Const'n Co. v. *Pratt Chuck Co.,* 179 Fed. 385. In this case two patents for improvements in outlet boxes for interior conduits were before the Court.

The patentee made a box of ductile metal and punched out disks to form the holes and then bent the disks back to cover the holes. This made an integral box in which orifices could be opened by driving out the disks. This application of the punching

out process to the box is all that was new in the invention. It was not an invention of great magnitude. The question in the case was whether or not the patentee was bound by his acquiescence in rejections of his claims by the Patent Office while his application was pending. The Court said that "it is the settled rule that inventors must be held to the form of claim which they have accepted under objections from the Patent Office," and found that the claims of one of the patents should be narrowly construed in view of the prior art and were not infringed by defendant; that of the two claims of the other patent sued on, one was limited by the art to its terms and the other of said two claims which did not contain limiting words was infringed. The decision accordingly recognized the well-settled rule of estoppel of a patentee by his acquiescence in rejections of the Patent Office to thereafter seek a construction of his accepted claims which will include that which he abandoned. The case has no other relevance to the present case.

Niles Tool Works v. *Betts Co.*, 27 Fed. 301. In this case the patent involved was for an improvement in turning and boring mills. The improvement related to a counterbalancing contrivance for the machine which consisted of a new arrangement of pulleys and other old elements. The Court upheld the patent, stating the well known rule that a combination of old elements is patentable if it produces new and useful results. This decision has no useful application in the case in hearing. The validity of the Wilfley patent is admitted by the defendant.

The case of *Beckwith* v. *Malleable Iron Range Co.*,

174 Fed. 1001, is to the same effect. The suit was on a patent for a stove in which the patentee made use of a convex rigid back-plate against which a sheet metal water reservoir was clamped. Defendant contended that claim 11 of the patent disclosed no invention on the ground that two of the elements were old and well known. The Court did not accept the argument, and said that it left out the fact that the invention is for a combination of three elements; that "the invention lies in the combination and not in the elements. These several elements are brought into combination to co-act in such a manner as to produce *a new result* or a better result than had been before achieved." The question was one of novelty of invention and has no bearing on the case at bar. The defendant also contended that the patentee should have claimed a "spherical convex back-plate," and not merely a "convex back-plate," upon the theory that the specification and drawings disclosed a spherical convex plate. The Court did not adopt this theory, but upheld the claims according to their terms just as we are contending should be done here.

In *Elizabeth* v. *Pavement Co.,* 97 U. S. 126, the patent before the Court was for an improvement in process of laying wood pavements. Defendant denied the validity of the patent and the Court sustained it because all of the elements of the claims had never been used in the same combination before the patentee. The case has no bearing whatever upon the present case.

In *Louden Machinery Co.* v. *Strickler,* 195 Fed. 751, the patent in suit was for improvements in hay

carriers. The patent was one appearing in a crowded art. The patentee applied a direct swivel connection between the dog and grappling hooks. The defendant's contention was that to save the claims of the patent from anticipation, it was necessary to limit the dog to one with a cut-out base, the defendant's dog having a solid base. The Court found that there was nothing in the prior art requiring any such limitation and held the claims valid and infringed. Here again is a patent for a device in which form of mechanical details is not essential. The device is totally different from an ore concentrator in which the form of the deck is the all-essential element. The case gives no light upon the questions involved in the present case.

In *Metallic Extraction Co.* v. *Brown,* 104 Fed. 345, the suit was for infringement of a patent for an improvement in double-deck ore roasting furnaces. In prior devices for the same purpose the stirring machinery was operated by chains and trucks which were drawn through the center of the furnaces where they were exposed to the heat, dust and fumes of the ore and soon destroyed. The patentee overcame this very serious defect by locating the chains and trucks in a supplemental chamber adjacent to the side of the roasting chamber and separated therefrom by a slotted wall or partition. The defendant's device had a supplementary chamber underneath the roasting chamber. The contention was that the invention covered by the first claim of the patent must be confined to a supplemental chamber at the side of the main roasting chamber because of the state of the

prior art. The Court found that the patentee was the first to conceive the idea of constructing a supplemental chamber adjacent to the oven of an ordinary ore roasting furnace and locating the stirring operating mechanism therein for the purpose of shielding it from the heat and prolonging its life, and that he made a marked advance in the art, even if his invention could not be properly termed a pioneer. The Court said, in refusing to follow the defendant's contention:

> "We are unable to find in Brown's specification, considered as an entirety, or in the art at the time his application was filed, sufficient reasons to warrant us in holding that he intended to claim less than what now appears to have been his full invention, and that the language of his claim locating the supplemental chamber 'at the side of the main roasting chamber' was used deliberately for the purpose of limiting it. We can conceive of no reason for such a self-imposed limitation, since it is obvious that whether the supplemental chamber was placed at the side of the main roasting oven, or underneath it, it would operate in the same manner and produce the same result."

The conclusion of the Court was right. There was a machine which had a serious defect in its mechanical structure which the patentee was the first to overcome. Form or arrangement of parts were not important, or essential to accomplish the desired end. In the present case the form of the surface of the deck of the ore concentrator is the essential part of the invention, and the specification of the patent clearly and very pointedly states that the invention consists in the arrangement of riffles of unequal

length with a smooth space adjoining their terminals upon which space the final cleaning of the concentrates is effected; and this limitation, together with the state of the art at the time the application was filed necessarily confines Wilfley to the language of his claims. The ore-roasting furnace decision does not aid the plaintiff in the present suit.

In *Brammer* v. *Schroeder,* 106 Fed. 918, the patent in suit was for an improvement in means for operating washing machines and related particularly to devices for translating the continuous rotary motion of a horizontal shaft in the same direction into the reciprocating rotary motion of a vertical shaft in opposite directions. The patentee was not the first to conceive the idea nor to provide means of performing the translation. His advance over the prior art was the combination of a "sliding cog-bearing cylinder by which alone the reciprocating rotary motion was imparted to the operating shaft" with other old and familiar elements. His first claim specified the combination of the sliding cylinder with a double row of teeth or cogs upon it and a driving shaft having a wheel on it for engaging the teeth on the cylinder. The defendant used the sliding cylinder with cogs on it, but used different means for holding the cogs in mesh with the driving pinion, and there were other differences in details of construction.

The Court found for the plaintiff, holding that the constructions in the defendant's device, which differed from those in the patent, were mere details—mere means of union and operation of the elements of the combination and not essential elements of the

combination, that they were "obvious mechanical devices to unite and operate the appellee's combination." The state of the art disclosed many devices adequate to accomplish that result, and the patentee did not describe the form of his cylinder as part of his invention—form was not essential to the invention.

The decision has no relevance to the present case, as form was not material to the invention, and the Court could very properly find that a mere change in the form and construction of certain elements of the combination which produced the same result would not evade the patent. Wilfley being an improver in an art where form is material he is entitled only to his own form under the rule announced in *Railway* v. *Sayles,* which rule is approved by the Court in the case of *Brammer* v. *Schroeder* we have just been discussing.

In *McSherry* v. *Dowagiac Co.,* 101 Fed. 716, the patent in suit was for an improvement in grain drills. The improvement consisted in the provision of draft rods attached at one end to the furrow cutting shoe of the drill and their other ends were pivoted to the frame of the drill. Two spring pressure rods were secured at one end to two clamping plates, which plates were pivotally connected to the draft bars. The other ends of the pressure rods were pivotally connected to a rocker arm by the rotation of which the spring rods were depressed to place tension on the draft bars and the shoe for the purpose of providing pressure on the shoe. Similar draft bars were pivotally connected to the pressure rods and also se-

cured to the covering wheel. The defendant made use of the shoe, the covering wheel, the draft bars and the spring pressure rods of the patent, but provided a different form of connection between the bars and pressure rods—it omitted the clamping plates.

The defendant sought to hold the claims of the patent to the specific clamping plates described in the patent, but the Court refused to so limit them because there was nothing in the art or record to require it, and because the patentee did not show any intention to confine himself to that construction, and because the form described was not of the essence of the invention. It follows that the patent was more than a mere improvement and was entitled to a reasonable range of equivalents. The decision has no relevance to the present case where form is most essential.

In *Penfield* v. *Chambers Bros. Co.,* 92 Fed. 639, the five patents sued on were for improvements in brick-making machines in which the patentee claimed a circular cut-off reel for effecting a square cut of the moving clay bar into brick lengths. The cutting wires were secured to the reel which were drawn through the clay bar, and to provide a variable speed for the reel in relation to the speed of the moving clay bar so that the wires would pass through the bar in a straight line, the patentee provided a two-winged cam which regulated the revolution of the reel. The claim was broad and called for mechanism to cause the reel, with the cutting wires attached thereto, to rotate in unison with and in the same direction as the clay bar so as to sever the bar into brick lengths.

The defendant's mechanism was substantially the

same as the plaintiff's except that he substituted for the rotatable cam and the wires fixed to the periphery of the reel, radially moving cutting wires and a fixed cam in the frame of the reel in which the wires engaged as they progressed through the clay bar.

The Court held that one of the patents in suit involved a high degree of invention but that the defendant had taken a different way of solving the problem of variable relative motion from that of the patent; that his scheme was more like the prior art than the patent, and did not infringe the claims. The facts of the case and the Court's decision are in favor of the defendant in the present case and support our position and contention.

In *Autopiano Co.* v. *Amphion Piano Player Co.*, 186 Fed. 159, the patent in suit was for a web-guiding device to regulate the lateral displacement of note sheets in musical instruments. In the prior art the note sheet was perforated along its margins and the sheet was caused to track properly by flanges on the rollers. This arrangement was very objectionable because the edges of the note sheet became injured. The patentee, for the purpose of overcoming this objection, made use of a surface control. He omitted the perforations in the margins of the note sheet and used devices which were automatically actuated by the sheet, which sheet when in its normal or central position served to hold the sheet-guiding or centralizing devices out of operation, and which by its divergence to one side or the other allowed the appropriate guiding or centralizing devices to come into operative contact. The object, therefore, was to avoid edge

control and accomplish a control by means of the margins of the sheet itself without any perforations.

Defendant made use of an edge control. Its note sheet did not normally close openings in the tracker bar, which openings would be exposed by the sheet should it deflect laterally on the tracker bar, as was the case in the device of the patent in suit. Defendant contended that the claims of the patent were limited to surface control by the specification and prior art and could not be expanded to include edge control. Plaintiff contended that the patent was a pioneer because it made possible an 88-note player whereas previous to the invention a 65-note player was the only one which was practicable; and that, therefore, the patent was entitled to a liberal construction.

The Court held that the patent was not a pioneer in the art; that it was a mere improvement or perfection in what had gone before. The result was an improvement or perfection upon the flange control. The Court said:

> "In one sense, it is, of course, true that any invention must be a distinct step in the progress of the art, but the pioneer step must be in a new direction, not along the path already indicated by what had gone before. Moreover, even in the case of a pioneer patent, the claims cannot be expanded so as to cover devices which are clearly excluded and the language of the specifications coupled with the claims themselves do not admit of the necessary expansion without disregarding the express limitations which O'Connor (the patentee) chose to impose upon himself for whatever reason that may have been."

The Court held that the patentee, while his application was pending in the Patent Office, expressly limited himself to the combination covered by his claims.

The decree was noninfringement.

This case bears strongly upon our contention in the present case. Wilfley clearly confined himself in his specification to the combination called for by his claims, and, as he is not a pioneer in the art of ore dressing, but a mere improver therein, he is not at liberty to broaden out his claims, nor can he include therein that which he has excluded.

In *Malignani* v. *Jasper Marsh Consol. El. Lamp Co.,* 180 Fed. 443, the patent in suit was for an improved process for evacuating incandescent lamps. The claim in suit called for several steps and the defendant sought to defeat the claim by contending that the patent, both in the specification and claim, directs that after the partial exhaustion of the bulb by means of a pump, the pump connection is to be sealed off before the filament is incandesced at all, and that such step was impractical and inoperative.

The Court held that the claim was not inoperative, and was valid and infringed; that there was nothing in the prior art anticipating the conditions created by the patent in a sealed bulb partially exhausted; and that no one before the patentee had learned that it was practical to finish the exhaustion of a globe by suspending pump action, sealing the bulb, introducing a vapor and making the filament highly incandescent. In view of the facts in the case the Court would not hold that the process described was *inoperative;* and made the statements of law which are

quoted on page 12 of plaintiff's brief in the present case. The case has no relevance to the present case. There is no claim here that the Wilfley patent is inoperative nor that there is any ambiguity or indefiniteness in the language of the patent. On the contrary the validity and operativeness of the Wilfley patent are admitted and the language of the patent is exceedingly clear.

In *McCormick Co.* v. *Aultman Co.,* 69 Fed. 371, the patents in suit were for improvements in twine binders. Previous to the first patent there were numerous patents for automatically binding grain, but the patentee of the patent in suit was the first to successfully bind grain in the field. The Court found that the patentee was the first to make use of toothed segments for effecting a compression of the bundle at the waist and the pressing and packing of the same against a triggering resistant; and that this step made the first practicable automatic binder. Accordingly the patent was substantially a pioneer in the art; and mere form of those parts was not material.

Robins Conveying Belt Co. v. *Am. Road Mach. Co.,* 145 Fed. 923. This was a suit on a patent for improvement in conveyor belt apparatus. The validity of the patent was contested, but the main defense was noninfringement. Many cases are cited in the opinion, and the finding was for the complainant. The apparatus was a complicated piece of machinery, and no questions arose in the case which appear to us to be at all applicable to the questions presented in this case.

Vrooman et al. v. *Penhallow et al.,* 179 Fed. 296.

The suit was on two patents for machines for topping vegetables like onions. One of the patents was granted in 1897 to Vrooman and Vrooman as joint inventors, and the other in 1901 to Arba Vrooman, who was one of the former patentees, for an improvement, and who assigned half of his interest to the other Vrooman, so that they were, in effect, joint patentees of both inventions. The Court found that the patent of 1897 was the pioneer in its field. The main question involved related to the proceedings in the Patent Office during the pendency of the first application, and the extent to which the patentees were affected by those proceedings. The following paragraph from an opinion by Justice SHIRAS in *Hillbone* v. *Hale Mfg. Co.*, 69 Fed. 958, is quoted with approval:

> "It may well be that a patentee cannot be permitted to hold under his patent anything that he has clearly renounced and excluded from his inventions during the prosecution of his application. But surely it has never been the law that mere changes of phraseology to suit the views of the examiner and to distinguish the claims made from those contained in prior applications to which reference has been made can be held to defeat the patent when granted. What is forbidden is the attempt, after a patent has been procured surrendering or disavowing some claims or devices, to recover such renounced and abandoned claims by demanding a broad construction of those allowed."

This has to do with the limitation of the claims of the Wilfley patent by the examiner's reference to Blatchly and Kustel. They showed a table which contained the same elements and the same combina-

tion of them as Wilfley's, broadly stated. They had riffles for concentration and a smooth space adjoining their terminals for washing up. But their riffles were of equal length. Wilfley was therefore required to limit his claims to riffles of unequal length, which was just what he showed in his drawings as filed with his application. Now, as the Court say in the case above, to attempt "to recover such renounced and abandoned claims by demanding a broad construction of those allowed" is not permitted.

Palmer et al. v. *Jordan Mach. Co.,* 186 Fed. 496. The suit was under a patent for apparatus for inverting tubular fabrics. The fabric was first drawn upon one end of a roller so that by taking hold of the end of it, it could be stripped and inverted or turned inside out in the operation. There were 8 claims in issue. The apparatus involved is a curious sort of machine, used as we fancy, in knitting-mills. The finding was for the defendant. We have searched the case in vain for anything pertinent to this case.

Long v. *Noye Mfg. Co.,* 192 Fed. 566. The suit here was on a patent for improvement in radiators for use in automobiles of the so-called honeycomb or cellular type. Three claims were in issue. It was found that the defendant infringed two of them, and not the third. A large part of the opinion is occupied by discussions about the meaning of the word "corrugation." We do not find anything that throws any light on the case before the Court.

Moore Filter Co. v. *Tonopah-Belmont Development Co.,* 201 Fed. 532. This suit was upon a patent

for a process of recovering gold from fine slimes. It is the cyanide process of which we have heard much in recent years. This method of extracting metal from waste matter has nothing in common with the method of extraction by concentrating tables. The patent was upheld as one for a pioneer invention, and the finding was for the plaintiff. It was held that as the apparatus shown in the patent was merely to illustrate a method of practically applying the process, the process patentee was not limited to the use of that type of machine. We have gone through the case carefully without finding anything that appears to us to be pertinent to this case.

Marshall & Stearns Co. v. *Murphy Mfg. Co.,* 199 Fed. 772. The suit here was on a patent for improvement in "apartment wall furniture." The structure consisted of a door or panel centrally pivoted at the top and bottom in the wall of the apartment so as to be turnable on a vertical axis. On one side was hinged a bed which could be folded up against the door when not in use. On the other side was any article of furniture for daylight use, such as a wardrobe, mirror or book-case.

The structure which was alleged to infringe was an ordinary door hinged at the side, upon the back of which was mounted a bed. The plaintiff was claiming a liberal construction of his claim. But it appeared from the file-wrapper that while the application of Jordan, the inventor, was pending an interference was declared between it and another application. The interference was decided against Jordan, who thereupon canceled some of his claims

and substituted some more limited ones. The interference application was subsequently abandoned and no patent was ever issued on it. Jordan then claimed that by reason of that abandonment there was no anticipation of his combination, and that he was entitled to the liberal construction of his patent which would have been allowed him if his original claims had been allowed. But the Court held against him, saying this:

> "This proposition cannot be sustained. Acquiescing in the rulings of the officials of the Patent Office, Jordan, in order to obtain his patent, limited his claims, and it can make no difference with the result that the interfering application was abandoned. The limitations so imposed cannot be disregarded."

After citing numerous cases the opinion quotes the following from *Morgan Envelope Co.* v. *Albany Perforated Wrapper Paper Co.,* 152 U. S. 425:

> "But the patentee having once presented his claim in that form, and the Patent Office having rejected it, and he having acquiesced in such rejection, he is, under repeated decisions of this Court, now estopped to claim the benefit of his rejected claim, *or such a construction of his present claim as would be equivalent thereto."*

On pages 34 to 42 of their brief counsel for the appellee discuss the subject of the action of the Patent Office in rejecting claims in their application by reference to the Blatchly and Kustel patent, and attempt to argue that the amendment of their claims which they made in obedience to the requirement of the examiner did not amount to an admission of the pertinence of the reference. We submit that the

foregoing decision completely answers that contention.

We have now examined and commented on 26 cases out of those cited in the extraordinary brief for the appellee. We think we have gone far enough to show that that brief is made up mainly, as we said at the outset, of irrelevant cases. We have here a very narrow question of law; we have a patented device of the utmost simplicity—just the riffled surface of a concentrating table, for we must not forget that by the express terms of the bill nothing is in issue except the "construction, adjustment and arrangement of the riffles" upon the table surface. The table is before us in models and drawings. It presents a clean-cut, two-part combination of a riffled surface and an unriffled surface. The three claims in suit state that combination in the plainest terms. Does the Deister table infringe those claims? No cases are relevant here that do not bear on that question. We have found none that do among the 26 which we have discussed. Shall we go on piling up pages for this busy Court to read in the discussion of the remainder? It seems to us that we shall be doing a wrong rather than a service to the Court. There are several other subjects which must be discussed in this brief to make it in proper sense a reply, as it must be, to which we now ask the consideration of the Court.

(1) There is a view of the case presented in the appellants' brief which appeared to us at the time to be sound, and if sound, controlling. It is in substance, first, that the whole field of ore concentrators

is one of very narrow inventions as respects the configurations forming the surface of the table, that the patents in that field are all improvement patents and must in consequence be limited to the very inventions described in them, or mere evasions thereof. On that subject we made a very painstaking study of the authorities and brought together a chain of cases reaching from 1857 to the present time, made up of decisions in patent cases of that kind—narrow improvement patents. We referred to the cases in detail, giving a short statement of the facts and issues in each, with a brief quotation from the opinion. That part of our brief occupies from page 76 to 97. We were, ourselves, surprised at what we found. No such array of cases on that subject had been brought together before to our knowledge. We thought it would be impossible for the Court to ignore them, and we think so yet. But the brief for the appellee makes no reference to them whatever. We cannot believe that the Court will treat them so cavalierly. What final effect the Court will give to them we cannot foresee. Perhaps not so sweeping as we argued; perhaps only to the extent that ore-concentrator patents are to be closely rather than broadly construed, and the monopolies created by them to be restricted in their scope. But that the Court will give *some effect* to them we cannot doubt.

(2) On pages 16 to 24 of our brief we describe the Deister table with microscopic minuteness, not omitting a square inch of its surface, and the operation of every riffle on it, with the purpose to show that it was an *advance in the art over the Wilfley table*—a

new invention. We covered this ground as well as we could in the oral argument. But the appellee's brief takes no notice of that part of our brief. This subject is important because, as we shall show a little later, the law is that if the Deister table is entitled to rank as a *new invention,* simply, it does not infringe.

(3) We wish to add a word of comment on the decision of the District Court upon a point that we now think was not quite adequately covered by the discussion of the opinion in our original brief. On page 73 of the record, after quoting the claims in suit, the Court proceeds as follows:

> "While the language differs in each one of the specifications quoted, it is quite apparent from a reading of these claims that in the view of the inventor the smooth, plain or unriffled area of the table constituted an important adjunct to the form and arrangement of riffles described, and discharged a function essential to the successful operation of his device. This is shown by the fact that in each and every instance in which he set forth and described his table, the form and arrangement of riffles is described as being in association with a smooth or unriffled surface. But, assuming that the association of the riffled surface of the table with the smooth or unriffled surface was deemed important or even essential in the view of the inventor, yet if the essential feature of his device, which was new in principle and which in itself constituted a distinct improvement in the art of concentration, may be used in other combinations or with other devices but yet so as to discharge the same or an equivalent function, does the want of foresight in Wilfley in specifying its use in conjunction with such 'smooth or unriffled surface' limit the pro-

> tection afforded by his patent to cases where his arrangement of riffles are similarly combined; that is, with a smooth or unriffled surface, or its mechanical equivalent? To answer this inquiry affirmatively would be to construe the patent as though it was 'for a narrow and specific improvement in an old art,' and nothing more than an improvement."

What was this "want of foresight in Wilfley"? What mistakes did it lead him into? In the first sentence of the quotation we are told that it is apparent that, "In the view of the inventor the smooth, plain or unriffled area of the table constituted an important adjunct to the form and arrangement of riffles described." Five lines further down it says: "But, assuming that the association of the riffled surface of the table with the smooth or unriffled surface was deemed important or even essential in the view of the inventor, yet if the essential feature of his device which was new in principle and which in itself constituted a distinct improvement in the art of concentration, may be used in other combinations or with other devices, but yet so as to discharge the same or an equivalent function, *does the want of foresight in Wilfley* in specifying its use in conjunction with such 'new or unriffled surface' limit the protection afforded by his patent to cases where his arrangement of riffles are similarly combined; that is, with a smooth or unriffled surface, or its mechanical equivalent?"

That is to say, it was a want of foresight in Wilfley to limit his claims so closely in respect to the "smooth or unriffled surface." He ought to have omitted that

feature of his claims, and as it was owing to a want of foresight that he did not, the Court felt warranted in disregarding it. And so in the last four lines of page 74 the Court says: "It seems to me that the Wilfley patent, in view of its history and its importance, should be construed, *notwithstanding the language used by the inventor in his application* as covering the appropriation by the Deister table of this essential feature of the Wilfley table." All of which means that he finds for the plaintiff "notwithstanding the language used by the inventor in his application." This shows unquestionably that the Court recognized that its finding was not in accordance with the terms of the claims. But it found as it did because it was impressed with the conviction that there was some extraordinary merit in the Wilfley patent, in view of which it was right to find infringement notwithstanding the finding was not in accordance with the terms of the claims. It is easy now to see where that impression came from. It was from the experts. The same sort of talk which we have quoted from the brief of counsel at the beginning of this brief.

(4) The appellants are not charged here with imitation of the Wilfley commercial table, and if they were they could not be held on that charge. They are liable only for *infringement of the Wilfley patent.* The table as put on the market, and the patent are two different things. This makes it necessary to look into the patent. It is printed on pages 299 to 303 of the record. The tapering riffles on the commercial table are an evolution. No one knows where

they came from. If Mr. Wilfley had been the inventor of them and had covered them by his patent and his claims he would have been master of the field so far as we can now see. The appellee's experts treat the case as though that were a fact. On pages 143 and 144 of the record Richards says that: "The Wilfley table was a great advance stride, and initiated a new era in concentrators; Wilfley put his riffles on with the diagonal endings—the advancing terminals, as they are called, and from a structural point of view also tapered his riffles and so added to the strength of the machine in getting an automatic control of the line of change of detention by such means."

But the only form of riffles shown in the patent is the metallic riffle commonly called a Z bar, that is, a strip of sheet metal pressed into the form of the letter Z. On sheet 1 of the drawings in Figs. 5 and 7 are shown cross-section outlines of the riffle (Rec., p. 299). On page 1 of the patent (Rec., p. 301), lines 32 to 40, there is this description of it:

> "Let the numeral 5 designate the table provided with longitudinal riffles 8, attached to its upper surface. These riffles are of unequal length and angular in cross section. The vertical or upwardly projecting part of the riffle is designated by the reference-character 8^a, and the upper part, which lies parallel with the bed of the table, is designated by the reference-character 8^c."

Then on page 2 of the patent, column 2, lines 67 to 98 (Rec., p. 302), there is a detailed description of the action and superior utility of the angular metallic riffles, which is as follows:

"The function of the angular riffles will now be described in detail.

"The part 8^a of the riffles would be sufficient alone to catch the larger and heavier particles of mineral, but some of the more minute particles would be forced over the riffles and carried downward with the gangue and perhaps finally lost were it not for the part 8^c of the riffles, which checks this tendency and allows specific gravity to prevail, the same as in hand-panning. It is well known that the finest particles of mineral can be saved by hand-panning. The specific gravity of the finest particles of gold is, of course, the same as the largest nugget, and if the proper conditions exist the minute particle can be saved as well as the nugget. The object of my angular riffles is to produce the conditions necessary to save not only the largest but also the finest mineral particles. Under ordinary conditions these fine particles when acted on by a current of water are carried along with the water, and consequently lost with the gangue. The upper part 8^c of my riffle checks the tendency of these light particles to pass over the riffles with the water. Hence they are confined by the bed of the table below the part 8^c of the riffles above, while the part 8^a of the riffles checks their downward movement. Hence under the influence of the table's movement or vibration the mineral particles, both fine and coarse, are caught by the riffles."

It follows that that part of the "advanced stride" which Wilfley made in the art, according to Richards, which consisted in the use of tapering riffles, is something entirely outside the patent. If it were not for the tapering riffles on the Deister table the appellee would have no pretense of any case against it. And as the patent does not cover the tapering riffles, how can we be said to infringe? If this view is sound, do we need any other defense?

It is not uncommon in the exploitation of patented inventions to introduce new features of construction in the apparatus suggested by practical experience. They usually improve it for use. The tapering riffles were such a feature and were an improvement in the table for use, no doubt. But a suit for infringement must rest on the patent, and nothing infringes that does not embody the construction described and claimed in it.

(5) There is an important line of cases referred to in the brief for the appellants and a defense based on them of which no notice is taken in the brief for the appellee, notwithstanding it presents a manifestly complete defense to the suit. The leading case of the series referred to is *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S. 537. All things considered, this is the greatest patent case of recent years. The subject matter was the most important that exists—the control of railway trains. The questions that arose in it covered nearly the whole field of the patent law. But the point that is pertinent here is that relating to the enforcement of the literal claims of patents against devices that constitute new and subsequent inventions. The doctrine of the case as applicable here is summed up in this quotation from the opinion on page 568:

> "The patentee may bring the defendant within the letter of his claims, but, *if the latter has so far changed the principles of the device* that the claims of the patent, literally construed, have ceased to represent his *actual invention,* he is as little subject to be adjudged an infringer as one

> who has violated the letter of a statute has to be convicted when he has done nothing in conflict with its spirit and intent."

The brief for the appellants contains, on pages 124 to 131, a discussion of this case and numerous subsequent cases in which it has been followed. The doctrine of the case is indisputably established in the law. Its controlling application here depends wholly on the question whether or no the Deister table is justly to be considered a *new invention* as compared with the Wilfley table. Upon that question the evidence is such as to admit of no doubt. Take these facts together: It came into the art ten years later than the Wilfley; it is less than half as large as the Wilfley, but will do as much work and do it better, and accomplishes these results by means which involve invention of the most meritorious kind. We produced in court at the hearing the original exhibits put in with the proofs, and handed up to the Court reduced copies of them made from zincograph cuts contained in our brief and mounted on cardboard. For fear those may not have been preserved we will go over that ground again very briefly.

First: The Deister table, as we tried to show at the hearing with the aid of a model, embodies a combination of riffles capable of doing far more perfect work than can be done on the Wilfley table, as proved by actual and undisputed measurements and tests. This superiority rests, first, on the presence of the high riffles on the table by which pools are created extending over nearly half the surface of the

table in which concentration goes on with the greatest possible rapidity and perfection. Next, on the action by which the concentrates are at once conveyed along the riffle troughs to the concentrates discharge where they are given a final washing and delivered in a condition of the most perfect purity into the concentrates box. All this is described in the brief for the appellants on pages 16 to 24 more minutely than we could do it at the hearing or can do it here. The cuts showing the relative areas of the tables are at page 65 of the brief; the competitive test at pages 61 to 65, and the output test of the Deister table at pages 120 to 122.

We submit that the proof that the Deister concentrator is a "new invention" within the meaning of the Westinghouse case and those following it is complete, and that we have in those facts a good defense to this suit.

(6) Finally, it has been established by many decisions that in an infringement case the burden of proof is on the plaintiff, and that if upon the whole case it is uncertain where the preponderance is in law and fact, the decision must be for the defendant.

This is a proposition which hardly needs authority. But there is authority in abundance. For instance, in *Fried Krupp Aktien-Gesellshaft* v. *Midvale Steel Co.*, 191 Fed. 588 (C. C. A. 3d Cir.), which was a suit on a series of armor plate patents, Judge BUFFINGTON said on page 591 of the report:

> "Infringement is not only a question of fact, but is a tort or wrong, the burden of establishing

> which, as in all torts, clearly rests on those who charge such wrong. The absence of actual fact proof is not met by the presence of expert speculations no matter how voluminous."

One would think that Judge BUFFINGTON had a foresight of the testimony of the experts in this case.

In *Béné* v. *Jeantet,* 129 U. S. 683, the suit was on a patent for refining and bleaching hair. All the testimony before the Court on the point in dispute was that of two experts, one of whom testified to facts within his knowledge, and the other to theories on the subject. There is substantially the same difference here. The evidence for the appellants rests on ascertained and demonstrated facts, measurements and tests; that for the appellee on theory and asseveration. The Court by LAMAR, J., said, on page 688:

> "We think the complainants did not make out a case of infringement. There is not a preponderance of evidence in their favor."

See, also, Walker on Patents, sec. 522 and cases cited.

3 Robinson on Patents, sec. 1041, where an immense number of cases are gathered together.

We feel as though we were abusing the kindness of the Court in filing such a long reply brief. But we were puzzled to know what to do with the extraordinary collection of cases in the appellee's brief. We thought it would not quite do to put them aside without any examination, and so took up the task as bravely as we could. But our time, strength and patience gave out at the 26th. That work has filled

more than half of this brief. The remainder we submit to the Court with the hope that it may be found pertinent and convincing.

Respectfully submitted,

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Solicitors and of Counsel for Appellant.

IN THE

UNITED STATES CIRCUIT COURT OF APPEALS

FOR THE NINTH CIRCUIT

Detroit Copper Mining Company of Arizona,
a Corporation,

Appellant,

vs.

The Mine and Smelter Supply Company,
a Corporation,

Appellee,

and

Arizona Copper Company, a Corporation,

Appellant,

vs.

The Mine and Smelter Supply Company,
a Corporation,

Appellee.

No. 2291

PETITION AND ARGUMENT FOR REHEARING

The appellants in said causes respectfully ask the court to grant a rehearing in the same and in support of this petition submit the following reasons therefor, and argument thereon.

1. The court erred in its view of the principle and function embodied in the Wilfley table.

2. The court attributed to the Wilfley table a degree and kind of novelty which it does not possess.

3. The court erred in giving undue weight to the fact that it does not appear that any of the concentrator patents prior to Wilfley's was successful or that any of the concentrating tables described therein went into general use.

4. The court disregarded the principle that in the construction of patents for narrow improvement inventions the claims should be strictly construed and the scope of the monopoly narrowed accordingly.

5. The court erred in its failure to give any effect in the case to the decisions of the Supreme Court in *Railway* v. *Sayles,* 97 U. S., 554, and *McCormick* v. *Talcott,* 20 How., 402, and the line of cases following them.

6. The court erred in holding that form is immaterial to the invention covered by the Wilfley patent.

7. The court failed to recognize principles embodied in the Deister table which impart novelty and value to it and distinguish it clearly from the Wilfley table.

8. The court erred in its failure to recognize the advance in the art embodied in the Deister table and the legal consequences resulting therefrom.

9. The court erred in its failure to give effect in its decision to the judgment of the Supreme Court in *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S. 537, and cases following it.

10. The court erred in finding infringement and affirming the judgment of the District Court.

ARGUMENT

In what follows we shall use for the sake of brevity the word table rather than the words ore concentrator to designate the machines in controversy and so speak throughout of the "Wilfley table" and the "Deister table."

Counsel for the appellee stand now as they have stood from the beginning on the ground that the Wilfley patent and table embody some novel and important principle by reason of which the claims of the patent are entitled to a very broad construction and wide range of equivalents. The claim was urged with so much vehemence in the District Court that the judge of that court thought that there must be some ground for it, and found for the plaintiff without knowing exactly why. Is there any ground for it?

The Wilfley table does embody a principle. If it did not it would not be a patentable invention. Section 4888, R. S. provides that in the case of an application for patent for a machine the applicant "In case of a machine he shall explain the principle thereof and the best mode in which he has contemplated applying that principle so as to distinguish it from other inventions." The word "principle" as here used is manifestly equivalent to "mode of operation." It is that which distinguishes the machine from others of the same class or kind. In the Wilfley table it is found in the combination of riffles of progressively increasing lengths, with a smooth or unriffled space adjoining their terminals. By the flow

of the pulp transversely across the riffles combined with the longitudinal reciprocating movements of the table the process of concentration is so far completed that when the material arrives at the terminals of the riffles only a residue of fine sand remains to be removed to complete the process of concentration. This removal is accomplished by the flow of water down the table and past the riffle tips so that the material as it emerges from the riffle troughs is first subjected to repeated washings and then to a further washing on the triangular smooth space as it is pushed out across it by the longitudinal movement. This final step in the concentrating process is called "washing-up." The combination of parts by which this result is accomplished on the Wilfley table is accurately described in the opinion, beginning at line 5 from the bottom of page 6 of the copy of it furnished to us by the clerk, and continuing to the end of the first paragraph of page 7. And on pages 3 and 4 the patentee's description of the process is quoted from the specification.

Every concentrator must contain some provision for washing-up in order to produce pure concentrates. The residue of sand which remains mingled with the particles of metal to the last minute is extremely fine and washing with water is the only way to separate it from the metal. The way of doing that described in the Wilfley patent is a good way and meets the requirement of the statute that a patentee shall explain the principle of his machine, and does in fact distinguish the Wilfley machine as the statute requires

from other inventions, because this specific way of washing-up is not found in any prior patent.

This is the only distinctive principle embodied in the Wilfley patent or table. What does it signify? As a *principle* it is not patentable. Patents are not granted for principles, or functions, or modes of operation, but for structures. There are many decisions of the Supreme Court affirming this proposition, but these will suffice:

In *Corning* v. *Burden,* 15 Howard, 252, the court said, on page 268:

> "It is well settled that a man can not have a patent for the function or abstract effect of a machine, but only for the machine which produces it."

In *Burr* v. *Duryee,* 1 Wall., 531, 570, the court said:

> "We find here no authority to grant a patent for a 'principle' or a 'mode of operation' or an idea, or any other abstraction. A machine is a concrete thing, consisting of parts, or of certain devices and combinations of devices."

In *Fuller* v. *Yentzer,* 94 U. S., 288, the court said, citing Burr v. Duryee:

> "Patents for a machine will not be sustained if the claim is for a result, the established rule being that the invention, if any,

> within the meaning of the Patent Act, consists in the means or apparatus by which the result is obtained, and not merely in the operation, independent of the mechanical devices employed; nor will a patent be held valid for a principle or for an idea, or any other mere abstraction."

Other cases could be cited by the dozen.

The structure of the Wilfley table is the very culmination of simplicity. Just the group of riffles of progressively increasing lengths with their diagonal line of terminals, the smooth space adjoining the terminals, the water supply and the oscillating movement. This enumeration of parts applies only to the surface of the tables. But that is all that is in question here. If the court will turn to page 11 of the record it will find that in the latter part of paragraph VIII the infringement charged consists in using Deister concentrators "with certain riffles upon the tops or concentrating surfaces thereof, which in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the improvements and inventions so patented to the said Arthur R. Wilfley as aforesaid." So that there is no issue in the case except that relating to the arrangement of riffles on the surface of the table. It is a pure question of *form*. We have used the word "configuration" in speaking of it, to which counsel for the plaintiff take violent exception. But we think that is exactly the right word to use. The *form* of a coin is its shape, which is round and flat. The superscription on the

faces of the coin are *configurations,* This is a nice and true distinction of words. When we say that the Wilfley table has one configuration of surface on its deck and the Deister table another configuration of surface on *its* deck we are using exactly the right words to describe the distinction.

The file wrapper of the Wilfley patent is in the record on pages 265 to page 305. It shows that the Wilfley application was rejected by the Examiner on a reference to a prior patent to Blactchly and Kustel, No. 258,879, dated June 6, 1882. He did not contest the reference, as he had a right to do. He could have appealed from the Examiner's decision to the Board of Examiners, and from there to the Commissioner of Patents and from him to the court. Instead of making any fight of that kind he amended his claims to avoid the reference and took out his patent as it now stands. There is a copy of the Blatchly and Kustel patent in the record on pages 357 to 361. The drawing is reproduced on page 134 of our brief with a description of the table and its operation. Shall we repeat that here? We must condense, or it will be impossible to say what must be said in this argument to make it intelligible. The sum of it is that the B. and K. table has every feature of construction and operation found in the Wilfley patent except the progressive lengthening of its riffles. They terminate along a line lying at right angles to their lengths. Wilfley's claims were, therefore, limited to read as they stand in the patent, and they must be applied as they read. Taken in that plain, straight forward sense they do not cover

the Deister table and cannot be made to. They describe a *group of riffles of progressively increasing lengths in combination with a single smooth space adjoining their terminals.* There is no such combination on the Deister table. The only testimony offered in the District Court of infringement of the Wilfley claims by the Deister table was that of the expert word-twisters, to whom, we are glad to note, this court makes no reference. The court does, however, say this in the opinion:

> "The improvement made by Wilfley, as measured by the prior art and as proven by the testimony, is evidently of such merit that the claims of his patent are entitled to a reasonably liberal construction. The mere form of his table does not measure the scope of his invention. He did more than to invent a table of a precise form and configuration. He discovered a method of application of principles and an effectual mode of operation, and the appellee should be protected in that feature of the combination which is new in principle and function."

There is no proof in the record of any extraordinary merit in the Wilfley table. There is no evidence that it will treat more material in a day than another table, or do it with less expenditure of power, or get more value out of the pulp, or turn out cleaner concentrates. These are the capabilities that constitute merit in an ore concentrator. There was no evidence at all on the part of the plaintiff on this subject. On this point the court has accepted the vociferation of counsel in the place of proof.

Mr. Wilfley was not a pioneer in the art of the wet concentration of ores. The court finds that in the following words on pages 2 and 3 of the opinion:

> "On referring to the patents introduced to show the prior art, it will be seen that they all contain two elements, a concentrating surface or table, usually consisting of a combination of riffles, and a clear or smooth space, and a reciprocating movement in the form of oscillation, the effect of which is to drive forward the pulp which rests on the surface of the table and to separate and stratify the mineral matter in the valleys between the riffles, while the gangue or base matter passes over to the lower side of the table from which it is thence removed."

This record, however, does not show fully how far down in the line of improvers his place was. On page 47 of the record, in the answer of the Arizona Copper Company, is given a list of 15 ore concentrator patents prior to Wilfley, the first being dated May 6, 1862; and on page 50, in an amendment of the answer, are 6 more, making 21 in all. These patents were all offered in evidence, and copies of them furnished to the clerk of this court to be bound in the record, but for some unexplained reason he inserted only 9. They are found on pages 309 to 361. These are enough to support the finding of the court that Wilfley was an improver, and not a pioneer. The court makes one remark about them, however, which we think is unwarranted. It is this, on page 6 of the opinion:

> "It is true that the use of concentrating tables with riffles and with smooth surfaces was old, and that patents prior to Wilfley's showed the wet concentration of ore on automatically vibrating tables having transverse riffles or corrugations for the purpose of arresting the metal and separating it from the gangue. It does not appear, however, that any of the prior patents was successful, or that any of the concentrating tables described therein went into general use."

The issue of a patent by the Commissioner is presumptive evidence that the invention described in it is new and useful. The burden of proof is on anyone who disputes either of those facts to prove his contention. So that when the defendant below put these patents in evidence it was not called upon to prove that the tables described in them had gone into general use. This point is expressly covered by the following extract from the opinion in the recent decision of this court in the case of *Hyde* v. *Minerals Separation, Limited,* et al, as published in the Mining and Scientific Press. The proposition is abundantly supported by the authorities cited by the court.

> "But the appellees say that the Froment patent is a paper patent, and that therefore it is to be disregarded. A paper patent, if it fully describes an invention, whether it be a machine, device, or process, is just as effective to show anticipation as a patent which describes an invention which has gone into extensive use, for a presumption of operativeness and of some utility attend the granting of Letters Patent. Packard v. Lac-

ing Stud Co., 70 Fed. 66; E. L. Watrous Mfg. Co. v. American Hardware Mfg. Co., 161 Fed. 362; National Chemical & Fertilizer Co. v. Swift & Co., 104 Fed. 87, 91; Universal Winding Co. v. Willimanitic Linen Co., 82 Fed. 228; Van Epps v. United Box Board & Paper Co., 143 Fed. 869; Ironclad Mfg. Co. v. Dairyman's Mfg. Co., 143 Fed. 512, 515; Dashiell v. Grosvenor, 162 U. S. 425, 432."

We suppose it would be open to the opposite party in such a case to offer evidence showing that the invention had never gone into use, or was unworkable. But no such evidence was offered in this case. So that these patents have their full force and effect in limiting the scope of the Wilfley patent.

We have assigned for error (No. 4) that the court failed in its decision to recognize the principle that in the construction of patents for narrow improvement inventions the claims must be strictly construed and the scope of the monopolies narrowed accordingly, and in particular, (No. 5) that the court erred in its failure to give any effect in the case to the decisions of the Supreme Court in *Railway* v. *Sayles,* 97 U. S., 554, and *McCormick,* v. *Talcott,* 20 Howard, 402, and the line of cases following them. These two decisions are undoubtedly the most important decisions in patent causes ever made by the Supreme Court. They and the cases which follow them cover the whole period of greatest activity in the patent field. *McCormick* v. *Talcott,* was decided in 1857. At that time the total number of patents which had been granted from the creation of the Patent Office was about

20,000; in 1911 it was over 1,000,000. In our brief we referred to and quoted from 17 cases expressly following one or the other of these decisions. We do not believe it possible to pile up another such mountain of authority on a patent question. And yet this court never so much as mentioned them. How can counsel be of any assistance to the court or any service to their clients if their citations of authority, no matter how numerous or weighty, receive no consideration from the court? Of course, if the cases were not pertinent to the facts no wrong would be done by ignoring them, no matter how much it might wound the pride of counsel.

But these cases are pertinent here. This court has found that the art of wet concentration of ores was old, as stated in an extract from the opinion which we have already quoted. The distinction between pioneers and improvers was never more clearly stated than by the Supreme Court in *Railway* v. *Sayles* just referred to, in this famous passage:

> "In such cases, if one inventor precedes all the rest, and strikes out something which includes and underlies all that they produce, he acquires a monopoly, and subjects them to tribute. But if the advance towards the thing desired is gradual, and proceeds step by step, so that no one can claim the complete whole, then each is entitled *only to the specific form of device which he produces,* and every other inventor is entitled to his own specific form, so long as it differs from those of his competitors, and does not include theirs."

In this case, as we have seen, the terms of the bill make the form or configuration of the table deck of the ore concentrator the *sole issue in the case.* The changes which may be made in that feature of a concentrating table—the form and arrangement of its riffles, are innumerable, so that the invention is in its nature a narrow one. Wilfley being an improver, and not a pioneer, we have the case of a narrow improvement invention, and one to which our great line of authorities applies with the closest pertinence. Are we not justified in feeling that the court did us injustice in ignoring our argument and authorities?

On page 8 of the opinion the court states in these words a principle which, as an abstract proposition is entirely sound:

> "But form is immaterial unless it is essential to the result, or indispensable by reason of the state of the art to the novelty of the claim. When the whole substance of the invention may be copied in a different form, it is the duty of courts and juries to look through the form for the substance of the invention. Winans v. Denmead, 15 How. 330; Metallic Extraction Co. v. Brown, 104 Fed. 345; Benbow-Brammer Mfg. Co. v. Simpson Mfg. Co. 132 Fed. 614."

But that is not this case. As we have already pointed out, the charge in the bill is that the defendant infringed by using tables "with certain riffles upon the tops or concentrating surfaces thereof which in their construction, adjustment, and arrangement upon said table surfaces substantially embody and contain the

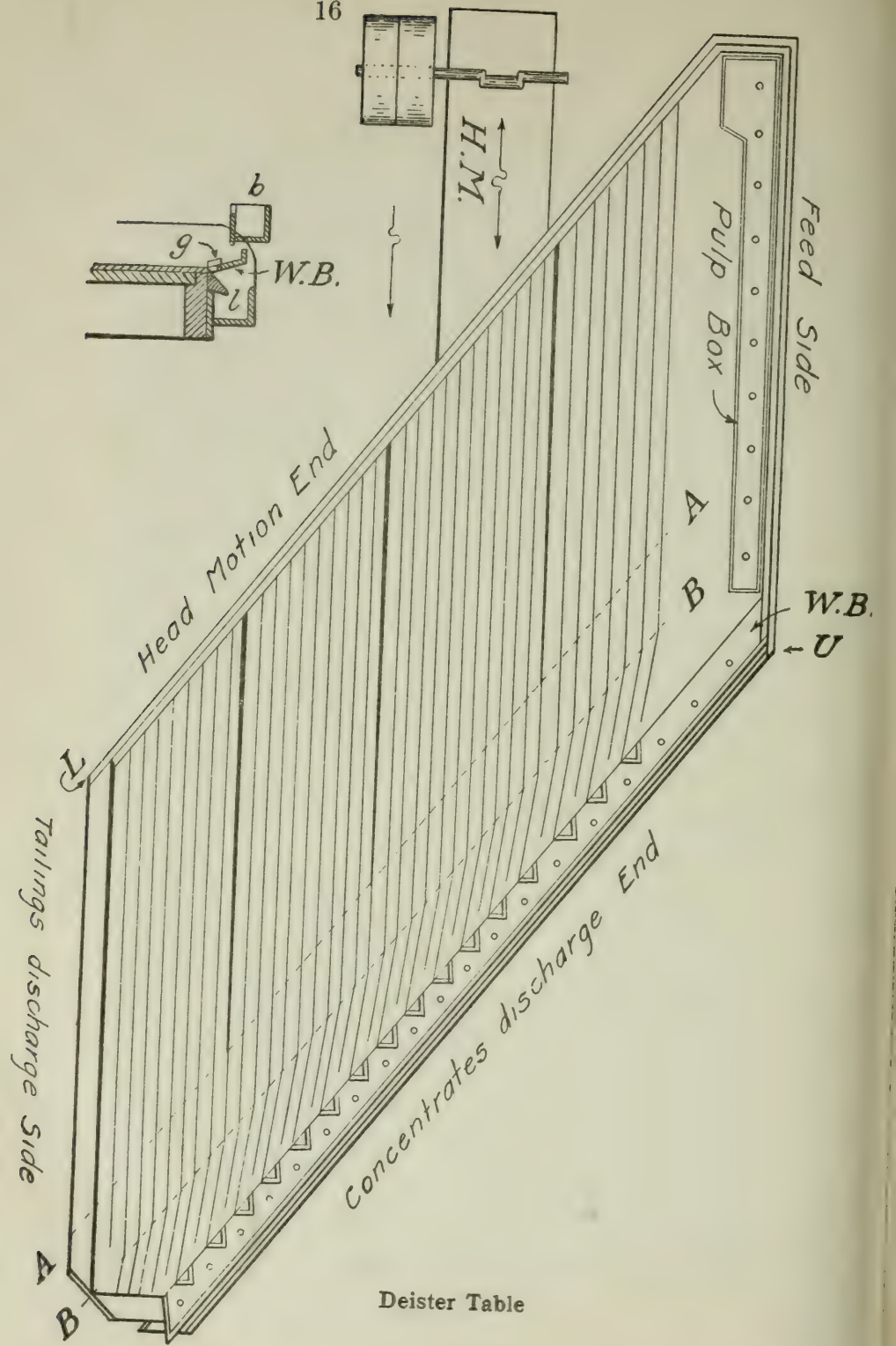
improvements and invention so patented to the said A. R. Wilfley."

That limits the issue as absolutely as words can do it to a pure question of form. So that form is not immaterial here, but fundamental. The decisions referred to by the court are inapplicable to this case.

Our seventh assignment of error is that the court erred in its failure to recognize principles embodied in the Deister table which impart novelty and value to it and distinguish it clearly from the Wilfley table; and the eighth is that the court failed to recognize the advance in the art embodied in the Deister table, and the legal consequences resulting therefrom. It will be convenient to consider these together. On page 238 of the record there is a drawing of the Deister table, on pages 240, 241 and 242 there is a description of the table and its operation. On the basis of that description we will call attention to those features of the table which are most important in this discussion. The drawing on page 16 is a reproduction of the drawing in the record; and for facility of comparison we also insert a reproduction of Figure 3 of the Wilfley patent. The general features of the Deister table are manifest at a glance—its rhomboidal form and the location of its riffles across the narrower dimension. These present two important peculiarities. The first is that four of them, denoted by heavy tapering lines, are higher than the others and slope from head to tip as indicated by the taper of the lines. These high riffles divide the others into four groups. The groups are of uniform elevation to the line AA where

all the riffles are equal in elevation. At that line there is an offset or step-down of 1/16 of an inch from which point the same elevation continues to the line BB where there is another step-down which brings the riffles to an elevation of 1/32 of an inch, at which they continue to their terminals. The reciprocating movement is denoted by the projecting piece H. M. which is a part of the machinery projecting from under the table. It is called the "head motion." It is the moving part of the mechanism which imparts the reciprocating movement to the table. The two headed arrow indicates that the movement is a to and fro oscillation and the single headed arrow indicates the direction of the resulting impulse on the material between the riffles. One would think that the words "end" and "side" should be reversed in their application. But mine men and draughtsmen have a habit of calling those parts of a table where the riffles originate and terminate ends whether the distance between them is the longer or shorter dimension of the table.

At the concentrates discharge end of the table there is a part called the washboard which fits snugly against the floor of the table and has a sharp slope toward the table surface. The construction, location and function of the washboard is best shown in the little drawing at the upper left-hand part of the page. It is there denoted by the letters W. B. and slopes down to the edge of the body of the table where the floor and its linoleum covering are seen under the letter *g*. Above the washboard is a waterbox which is kept filled and from which water runs out through a notch



Deister Table

(No Model.) 2 Sheets—Sheet 2.

A. R. WILFLEY.

ORE CONCENTRATOR.

No. 590,675 Patented Sept. 28, 1897

FIG. 3.

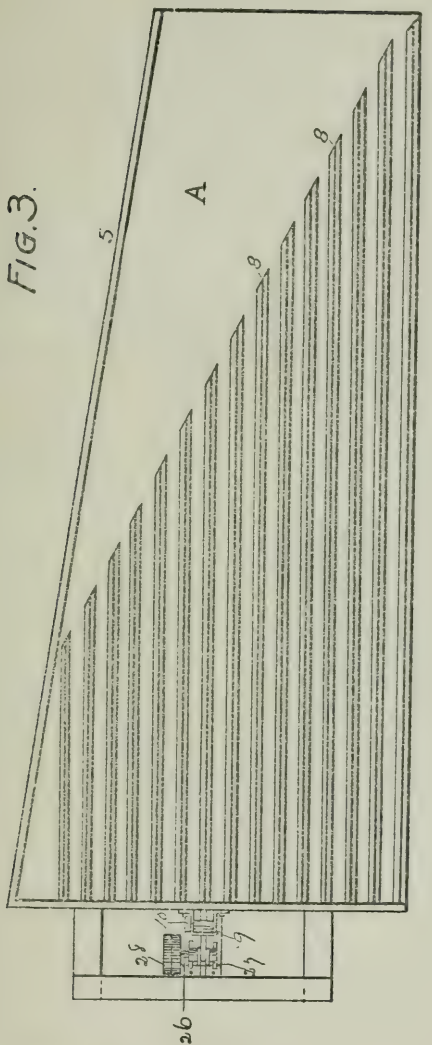
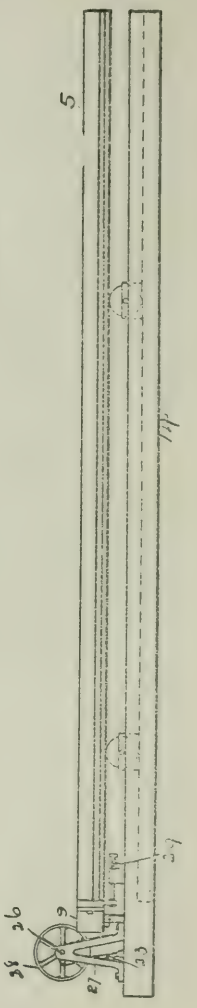


FIG. 4.



Witnesses
Edith Hinsworth

Inventor
A. R. Wilfley
By his Attorney

in its side, so as to keep the surface of the washboard covered all the time with a thin film of flowing water. At *g* is an aperture through the washboard with a V-shaped guard above it which prevents water flowing across the washboard from escaping through the aperture. At *l* is a concentrates trough or box extending along the concentrates discharge end of the table into which the concentrates are conducted by a spout. The washboard is shown on the main drawing at W. B. The minute circles show where water falls on it from the box *b* and along the lower edge of it are shown the V-shaped guards which prevent the water from flowing through the apertures in the angles of the guards.

To return now to the surface of the table, it will be seen that across the space or zone between the line BB and the concentrates discharge, the riffles are deflected slightly toward the foot of the table and that every alternating riffle is a little shorter (about two inches) than the one next above it. Here comes in the function of the washboard. By the time the material under treatment reaches the three cornered spaces all the coarse sand has been removed and there remains only a residue of fine sand to be washed out. This is done by the water flowing down the washboard as we have described. This is the way the washing-up process is performed on the Deister table. As will be seen, the lower one of each pair of riffles registers with the opening in the washboard in the angle of a V-shaped guard, so that the concentrates

which came by that pair of riffle troughs pass through a single aperture into the concentrates box.

At the feed side is shown the pulp box. This is raised slightly above the surface of the table, so that pulp flowing through the holes which are shown in it will spread over the unriffled space adjacent to the feed side. The pulp is fed from a spout discharging into the enlarged portion of the pulp box. With the assistance of the vibratory motion of the table the pulp tends to flow along the pulp box and out through the holes in it and spread over the unriffled surface below it. The table slopes generally from the feed side to the tailings discharge side, so that the pulp travels across the riffles leaving its valuable grains of metal between them as it goes until it falls off at the tailings discharge side as waste.

But this general declivity of surface is qualified by minor inequalities of elevation which play an important part in the operation of the table. When in operation the corner U is the highest point on the table, and the corner L the lowest. From its head motion end to its concentrates discharge end the whole table has a slight slope upward. The vibratory movement causes the particles of metal to creep across the table along the riffle troughs. It would appear from this that the metallic particles are driven uphill as they creep along the riffle troughs, which is the fact, and an important fact, as we shall see.

We can now picture to ourselves the action of the table in operation. It is covered with pulp flowing across the riffles from the pulp box to the tailings

discharge with a sort of tremulus movement caused by the vibrations of the table. As it goes the heavy particles of metal gravitate to the bottoms of the riffle troughs until, when it reaches the tailings discharge, they have all dropped out, and under the impelling force of the vibrating movement are creeping along the riffle troughs toward the concentrates discharge end. This is a continuous process going on hour after hour all day long.

But there other features of construction to be attended to which improve it still further. The high riffles have a utility not yet mentioned. They form dams across the table, above which pools are created which flood the riffles above them for some distance —something like half way to the next high riffle above. In these pools the particles of metal have a little more time to settle than they would have if the high riffles were not there. As they pass out of them they are pushed along the riffle troughs by the vibratory movements toward the concentrates discharge.

The water which comes from the washboard serves also another useful function besides the final washing up of the concentrates. It has been stated that when the table is in operation the corner U is the highest point on it, and the corner L the lowest. From this fact, water flowing over the table will tend to cross the riffles nearly at right angles to them. This applies to all the water coming from the washboard. The water, in the first place, replenishes the pools formed above the high riffles, and in the diluted fluid thus produced the metallic particles settle more readily

to the bottoms of the troughs, to be pushed on along them, as heretofore described. In the next place, that flow of water across the comparatively low riffles in the zones between the lines AA and BB, and BB and the concentrates discharge outlets operates to wash the sand remaining in them at the last minute down to the tailings discharge.

The Deister table came into the field long after the issue of the Wilfley patent, and is claimed to represent a large advance in the art. At the time this suit was begun it had not been patented. The court will want to understand its construction and operation as perfectly as possible. We will add to the general description just given a reference to three points which are specifically deserving of notice. The first of these is the high riffles already mentioned. The function which they perform of creating pools above them which flood the riffles about half way to the next riffle above is a unique and valuable feature of the table. It is by a process of stratification that all concentrating tables work. If the mineral would not settle in the bottom of the riffle trough it might flow over a hundred of them and come off at the foot in the same condition in which it started. This stratification is greatly accelerated by dilution. If a man would put a pint of pulp and two quarts of water in a pan and shake it a few minutes with his hands, then pour off the top and put in more water, he would by and by have the mineral in the bottom of the pan. This is the method by which the forty-niners gathered gold from the sands and gravel in California. The modern

ore concentrator is only an evolution from the forty-niner's pan.

The pulp flowing down the Deister table stops only for an instant in the pools above the high riffles. But for that instant the process of stratification goes on more rapidly than it would go if the pool were not there. In its passage from the head to the foot of the table it crosses about sixteen of these riffle trough pools. This dilution in connection with the jarring produced by the reciprocating movement with its 250 vibrations per minute makes the mineral particles tumble down fast. There are no such pools as these on the Wilfley table.

In the next place it will be observed that on the Deister table the riffles in the division above the first high riffle are further apart than those in the divisions below it. They are also higher. When the pulp first emerges upon the table from the feed box it is rich in mineral. It begins to stratify at once, and concentration goes on rapidly. The fine particles of mineral cannot climb over the high riffles, but the coarser grains of sand can. The riffles in that group are specially adapted to the condition of the pulp at its first entrance on the table. The pulp which goes over the first high riffle to be concentrated in the second group is comparatively poor stuff; that which reaches the third group poorer yet, and that which crosses the fourth group is poverty stricken.

Finally, a word further in relation to the low riffles in the zone between the line BB and the concentrates discharge. By the time the material reaches that

zone the coarse sand has all gone over the riffles and down to the tailings discharge. But there remains a residue of very fine sand which it is difficult to separate from the mineral. It will go over riffles if they are low enough, but they must be very low. The mineral particles mixed with it will also go over the riffles if they are low enough. The problem is to provide riffles low enough to let the fine sand go over, and at the same time high enough to keep the concentrates back. Mr. Deister found that as a rule one thirty-second of an inch would meet those conditions. But there is no magic in that exact figure. They might be a sixty-fourth of an inch higher and work well. And with pulp of relatively coarse quality a sixteenth of an inch will be best.

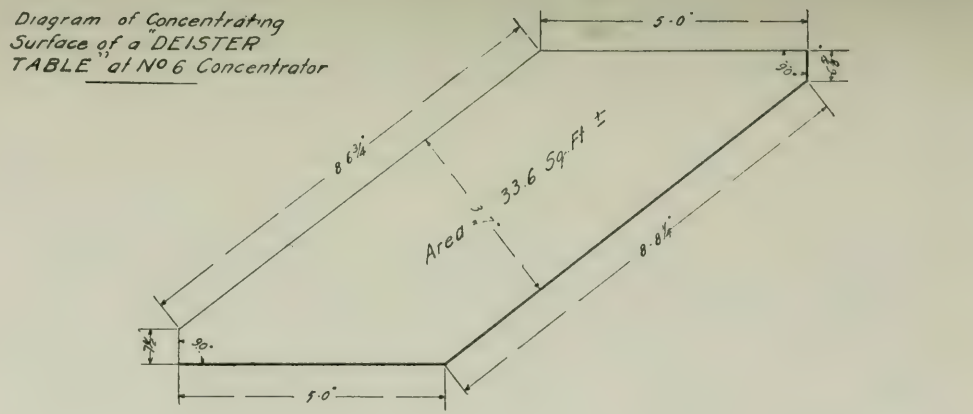
The deflection of the low riffles is for this purpose: In that zone the material is subject to two forces acting in different directions—one the force of the reciprocating movement, which tends to impel the material straight on to the concentrates discharge; the other the force of gravity and the flow of the water coming from the washboard which tend to carry the material down toward the foot of the table. The resultant of these forces is along a slightly deflected line across the zone between the line BB and the concentrates discharge. And so by accommodating the riffles in that zone to that line it becomes a little easier to let the sand over and hold the concentrates back. This feature is the last refinement of construction in the most highly developed table in the art at the time it came out, every square inch of which does perfect work. But the

deflected position of the low riffles is not a fundamental, nor even an important feature of the table. The riffles could keep straight on to the concentrates discharge without substantial change in the operation of the table.

What is invention? *The adaptation of means to ends.*

The Deister table exhibits invention of a high order. No candid man can deny that. It shows an advance in the art over Wilfley. No candid man can deny that, either. That was only what was to be expected. The Wilfley patent was 12 years old when the Deister table was put into the concentrating mills of the appellants at Morenci, Arizona. That was its first appearance—before it was patented. Was it not to be expected that there would be some advance in the art in that interval? It was. It would have been strange if it had not been so. Every square inch of the surface of the Deister table bears the stamp of invention. Its combination of high and low riffles; its pools above the high riffles; its scheme for washing up in little subdivided spaces; its water supply coming in a thin film over the washboard, which is all the water supplied to the table; by all which means taken together every square inch of its surface does useful work. All these did not happen by chance. They are the product of invention.

The operation of the table proves it. On page 246 of the record there is a condensed statement of the testimony of Gustavus E. Hunt, who was the superintendent of the concentrating mills of the Detroit Copper Mining Company and who had in use 38 Wilfley



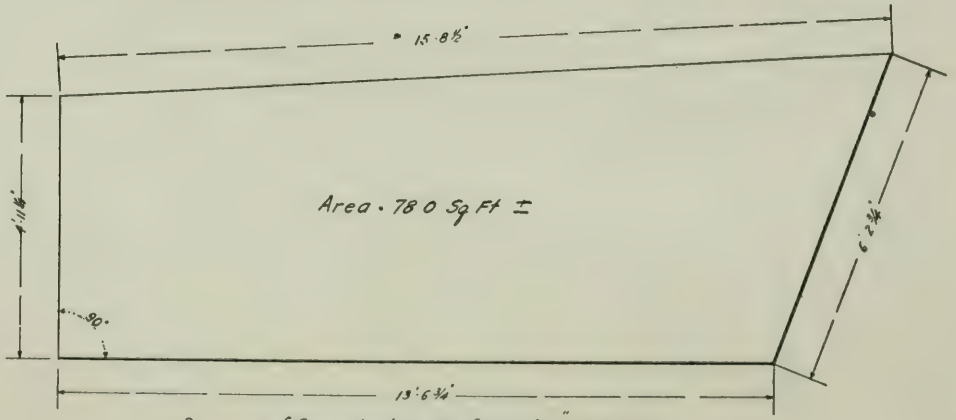


Diagram of Concentrating Surface of a "WILFLEY
TABLE" at No 6 Concentrator

tables in that mill with a number of Deister tables and who had good opportunity to compare the work of the two tables. He produced two drawings showing the comparative areas of their concentrating surfaces. These drawings so put in evidence are now in the hands of the clerk as an exhibit, as appears on page 253 of the record. We insert a reproduction of these drawings here. They show an area of 33.6 sq. ft. of concentrating surface on the deck of the Deister table against 78 sq. ft. on the Wilfley—a good deal less than half. And yet, as Mr. Hunt testifies, the Deister table would handle as much material as the Wilfley.

This is important. These tables are always used in great concentrating mills where they are under roof, and dozens, scores, or hundreds of them are gathered in one building. A table that will do the same work in one-half the space is an enormous gain.

Not only the same amount of work as the smaller tables, but more effectively. On page 246 of the record John Kiddie testifies that in January, 1909, he made a comparative test of a Wilfley and a Deister machine under the direction of Mr. Carmichael, the general manager of the Arizona Copper Company. He details at length the method employed to secure fairness and accuracy in the test. It extended over 12 days. He produced a tabulated record of the test which is on file among the exhibits, as appears on page 253 of the record. We reproduce that table here. It will take a little study to realize its full significance. In the first column are the dates of the

Date	Machine	Hrs Run	Tons Feed per 24 hours	Pounds Dry Concentrates	Assay of Concentrates	Pounds Copper in Concentrates	% Relative Saving in Terms of Wilfley	Approx Extraction	Assay of Heads	Assay of Tails	% Solids in Feed	Stroke in Ins.	R P M	Table
1/16/09	Deister	2½	12.24	297¾	17.28	51.45	115.1	67.6	2.86	1.03		3/4	280	3/4"
"	Wilfley	"		249½	17.89	44.63	100.0	60.0	2.86	1.24		1	262	
1/17/09	Deister	2	12.52	211	17.93	37.83	108.3	61.4	2.89	1.24	3.18	1 3/16	283	3/4"
"	Wilfley	"		210	16.63	34.92	100.0	57.0		1.38		1		
1/18/09	Deister	2	9.94	255	13.03	33.23	119.2	78.0	2.62	0.83	2.49	1 3/16	280	1"
"	Wilfley	"		208¾	13.35	27.87	100.0	68.0		0.97		1		
1/19/09	Deister	2	12.69	302¾	16.25	49.20	118.5	70.0	3.22	1.12	28.4	1 3/16	288	1¼"
"	Wilfley	"		262¼	15.82	41.49	100.0	63.0		1.37		1		
1/20/09	Deister	2	13.17	354	16.00	56.64	121.5	70.5	3.51	1.23	27.4	1 3/16	281	3/4"
"	Wilfley	"		310	15.03	46.59	100.0	63.3		1.51		1		
1/21/09	Deister	2	8.52	260¼	12.70	33.02	120.8	74.2	2.90	0.83	29.0	1 3/16	281	3/4"
"	Wilfley	"		212¼	12.87	27.35	100.0	67.6		1.11		1		
4/22/09	Deister	2	16.33	298	11.62	34.63	117.6	59.0	2.13	0.98	27.5	1 1/16		3/4"
"	Wilfley	"		231	12.74	29.43	100.0	51.5		1.13		1		
1/23/09	Deister	2	13.20	288	15.80	45.50	106.0	69.3	2.97	1.05	25.4	3/4	283	1"
"	Wilfley	"	13.46	248	17.30	42.90	100.0	64.5		1.19		1		
1/24/09	Deister	1½	38.65	357	13.10	46.70	117.9	44.7	2.12	1.26	32.4	1 3/16	281	1¼"
"	Wilfley	"		260	14.20	39.60	100.0	36.5		1.42		1		
2/1/09	Deister	2	19.84	343	12.60	43.22	111.0	61.1	2.10	0.91	16.2	1 3/16	281	1⅛"
"	Wilfley	2		315½	12.30	38.81	100.0	57.1		1.00		1¼		
2/2/09	Deister	2	17.65	299½	15.57	46.63	110.0	61.8	2.56	1.09	16.6	1 3/16	280	1⅛"
"	Wilfley	"		288½	14.66	42.29	100.0	56.3		1.24		1¼		
2/3/09	Deister	1½	25.50	268	12.74	34.14	136.6	52.1	1.99	1.04	23.5	1 3/16		1⅛"
"	Wilfley	"		195½	11.12	21.74	100.0	35.5		1.37		1 7/16		
1/26/09	Deister	2	9.37	244	11.50	28.06	100.7	68.5	2.56	0.95	21.9	3/4	287	2"
"	Vanner	"		169	16.50	27.88	100.0	67.5		0.93		1	210	

Run of 1/20/09 - Measuring on Linolium, discharge end of Deister Table was ½" lower than Feed end
" " 1/26/09 - " " " " " " " " " ½" higher "

	Deister Table	Wilfley Table
Direct Average of Tailings	1.05%	1.24%
" " Concentrates	14.55%	14.49%

Forward end of high Riffles removed

6.1 20 - 4.15 40 - 13.7 60 - 6.5 80 - 4.5 100 - 6.8 200 20.9 - % Wt.
0.43 1.23 2.64 4.39 6.25 8.06 3.52 - % Cu

7.0 20 - 30.6 40 - 10.4 60 - 9.5 100 - 7.4 200 35.1 % Wt
1.54 1.45 2.04 2.90 4.25 2.08 - % Cu

Feed: Spigot of Cone hydr. Classifier

16.2 20 - 4.19 40 - 8.9 60 - 3.6 80 - 3.9 100 - 4.8 200 21.9 - % Wt.
1.14 1.35 2.99 3.12 3.90 5.00 3.00 - % Cu.

5.6 20 - 28.5 40 - 10.5 60 - 10.9 100 - 10.5 200 34.0 - % Wt.
1.10 1.01 1.79 3.92 5.32 2.78 - % Cu

daily tests. Opposite these dates are the results of the tests for that day under appropriate columns. The figures in the column headed "Pounds of dry concentrates" furnish the first basis of comparison. Running down this column it will be seen that the Deister table is way ahead every time. All other points of comparison, however, are merged in the column headed "Savings in terms of Wilfley." In that column the total saving of copper from the pulp fed to the Wilfley machine is represented arbitrarily by 100, and the total saving by the Deister machine stated in the form of a per cent. upon 100. This furnishes a perfect basis of comparison. If in any run the saving made by the Deister table were exactly equal to that made by the Wilfley it will be denoted by 100. If less, by a minus figure, as—10; if more, by a figure above 100. The Deister figures in the column are all more than 100. That means that the Deister table made a greater saving than the Wilfley every time. They show an average of approximately 116. That is, the Deister table extracted nearly 1/6 more copper from the same pulp.

This is a wonderful showing. That the smaller table should not only do as much work as the larger one, but do it so much better as to get 16 per cent more value out of the same pulp caps the climax. There is a reason for it. It is the invention embodied in the table—the wise adaptation of means to ends; the new arrangement of riffles; the combination of high and low riffles; the new way of washing-up in minute areas instead of *en masse* with the whole output

of the table on one big space. *And all this is absolutely uncontradicted.* Counsel for the plaintiff were present when the witnesses were examined and cross-examined them. They were offered opportunity to verify all the tests, but declined to do it. *Are we not justified beyond all cavil in our claim that the Deister table embodies new invention and represents an advance in the art over its senior competitor* 12 *years older?*

This Court has decided that the claims of the Wilfley patent cover the Deister table. We have offered our arguments against that construction. But for what is to follow we admit it to be correct. We have then, the case of a patent whose claims in words cover a later structure embodying a new invention—the result of subsequent progress in the art. This brings the case within the purview of the decision of the Supreme Court in *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S., 537. This was a suit for infringement of claims 1, 2 and 4 of patent 360,070 to George Westinghouse, March 29, 1887, for improvement in air brakes. It was heard originally by the Circuit Court for the District of Maryland, which found for the defendant. 66 Fed., 997. Appeal was taken to the Circuit Court of Appeals for the Fourth Circuit, where the judgment of the District Court was affirmed as to claims 1 and 4, and reversed as to claim 2. 70 Fed., 816. From this judgment both parties applied for a writ of *certiorari* to the Supreme Court, which was granted.

The case is a great one. It deals with many ques-

tions. The invention involved related to an art second to none in its importance to mankind—the control of railway trains. It was conceded that Mr. Westinghouse was the pioneer in air brakes. As such the court on page 562, rank him with Howe of the sewing machine, Morse of the electric telegraph, and Bell of the telephone. But his pioneer patent had expired. He had taken out numerous patents for improvements, as also had a competitor, Geo. A. Boyden, who had made what the court regarded as a highly meritorious improvement. Comparing the Westinghouse and Boyden improvements, the court said this on pages 572-3 of the report:

> "The underlying distinction between the two devices is that in one, a separate valve and separate by-passage are provided for the train-pipe air, while in the other, the patentee has taken the old triple (or quadruple) valve, and by a slight change in the functions of two of its valves and the incorporation of a new element (partition 9), has made a more perfect brake than the one described in the Westinghouse patent. If the credit be due to Mr. Westinghouse for having invented the function, Mr. Boyden has certainly exhibited great ingenuity in the discovery of a new and more perfect method of performing such function. If his patent be compared with the later Westinghouse patent No. 376,837, which appears to have been the first completely successful one, the difference between the two, both in form and principle, becomes still more apparent, and the greater simplicity of the Boyden patent certainly entitles it to a favorable consideration. + + + Under such circumstances, the law entitles him to the rights of an independent inventor."

The principle which we wish to apply here, and for the sake of which we cite the case, is stated thus on page 568:

> "But even if it be conceded that the Boyden device corresponds with the letter of the Westinghouse claims, that does not settle the question of infringement. We have repeatedly held that a charge of infringement is sometimes made out, through the letter of the claims be avoided. *Machine* v. *Murphy,* 97 U. S., 120; *Ives* v. *Hamilton,* 92 U. S., 426, 431; *Morey* v. *Lockwood,* 8 Wall., 230; *Elizabeth* v. *Pavement Company,* 97 U. S., 126, 137; *Sessions* v. *Romadka,* 145 U. S., 29; *Hoyt* v. *Horne,* 145 U. S., 302. The converse is equally true. The patentee may bring the defendant within the letter of his claims, but if the latter has *so far changed the principle of the device* that the claims of the patent, literally construed, have ceased to represent his *actual invention,* he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent."

This decision has been followed by others to the same effect since, to some of which we beg leave to refer.

Norton v. *Wheaton,* 97 Fed., 636 (Northern Dist. Cal., 1899), was a suit on a patent for improvements in can-ending machines. The court said, on page 641:

> "In *Westinghouse* v. *Brake Co.,* 170, U. S., 537, 568, the Supreme Court, had before it the question of infringement involved in the mechanism for opening and closing certain valves in automatic air brakes. It was con-

tended on the part of the complainant in that case that he was a pioneer inventor, and that the alleged infringing device corresponded to the very letter of the claims of the complainant's patent; but it was held that even this fact was not sufficient to establish infringement. The court said':

" 'The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principles of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted when he has done nothing in conflict with its spirit and intent.' "

Standard Computing Scale Co. v. *Computing Scale Co.,* 126 Fed., 639 (C. C. A., Sixth Circuit, 1903), was a suit for infringement of a number of patents for improvements in "weighing and price scales." The following is from the opinion, page 649:

"Unless we attribute to the Culmer patent a scope so wide as to include all means of affecting flexibility between the beams, the applicant does not infringe, for it would be difficult to conceive things more unlike. It may be true that the appellant's structure would meet in a general way the calls of the first claim of the Culmer patent; but, if so, it is a capital illustration of the truth of what was said by Mr. Justice BROWN in delivering the opinion of the Supreme Court in *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S., at page 568, when he said:

Then follows the extract from the Westinghouse case just quoted. The court found for the defendant.

Severy Process Co. v. *Harper & Bros.*, 113 Fed., 581, 584 (S. Dist. New Jersey, 1902). Patent for improvement in platens for printing presses. Cites *Westinghouse* v. *Boyden Power Brake Co.*, and states the principle in these words, on page 584:

> "Claims should not be so broadened by construction as to include devices which, though accomplishing the same function, do so by new combinations operating upon principles so different as to entitle their originator to be considered as an independent inventor."

Gen. Elec. Co. v. *Allis-Chalmers Co.*, 171 Fed., 666 (C. C. N. J., 1909), was for infringement of a patent for "attachment for notched quadrants," which are devices used in the operation of electric motors. It was held that the patent was not infringed. The court refers to the Westinghouse case in these words, on page 669:

> "The complainant's invention was not broadly new; it did, however, make some advance upon the art, and is entitled to a reasonable but restricted application of the doctrine of equivalents. It will be observed that the claim in issue is very broad, broad enough indeed to embrace any and all means of supporting the latch, no matter whether the means were new or old, or within, or without, the range of equivalents. The fact, however, that the defendant's device may be within the language of the claim does not of itself prove that it is an infringement. Infringement is not a mere matter of words."

The finding was for the defendant.

> "In *Westinghouse* v. *Boyden,* 170 U. S., 537, at page 568, Mr. Justice Brown, in delivering the opinion of the court, said:"

quoting the same paragraph above.

In the same case on appeal in *Gen. Elec. Co.* v. *Allis-Chalmers Co.,* 178 Fed., 273, the Court of Appeals, 3rd Cir., affirmed the judgment below with this remark at the close of the opinion on page 276:

> "The mere fact that the defendant's device may be within the letter of the claim sued on is not conclusive proof of infringement. This is shown in the opinion of Judge Cross in the Court below (171 Fed., 666). We concur in the conclusion expressed by him in that opinion."

American Stoker Co. v. *Underfeed Stoker Co. of America,* 182 Fed., 642 (Cir. Ct. W. Dist. Pa., 1910). The suit was on a patent to James Garden for mechanical furnace stoker. After a discussion of the prior art and the construction of the devices employed by the parties respectively, the court said, on page 653:

> "We have then an entirely different furnace from the one described by Garden. It is true dead-plates are used, and that the result of their use is that the furnace becomes sealed and the gas does not flow down or the air escape upwards from the air box; but the new function which the defendant seeks to accomplish is by the use of the entire space underneath as a reservoir. I cannot avoid the conclusion that this was not an infringement of complainant's patent.
>
> "I am of the opinion that the case of *Westinghouse* v. *Boyden Power Brake Co.,*

170 U. S., 537, 568, is authority for this conclusion. The court there said:

> " 'The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principle of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent.' "

The finding was for the defendant.

Here is another chain of cases, beginning with *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S., 537, decided in 1898, and running down to 182 Fed., decided in 1910, in every one of which cases the Westinghouse case is followed, and these words quoted or expressly referred to, from page 568 of the report.

These decisions apply in this case with peculiar force. The patent in suit is an old one. It was an old one when this suit was begun. It was issued Sept. 28, 1897. The bill was filed Feb. 24, 1910. The patent was then over twelve years old. In the meantime the art had been developing. New ore concentrators had come into the field. The Deister was one of them. The words of Justice Brown in the Westinghouse case fit here as perfectly as there. He said, "by slight change in the functions of two of its valves and the incorporation of a new element he (Boyden) has made a more perfect brake than the one described in the Westinghouse patent." So Deister by the

ingenious construction of his table which we have described, made a more perfect table than the Wilfley, as its operation demonstrated.

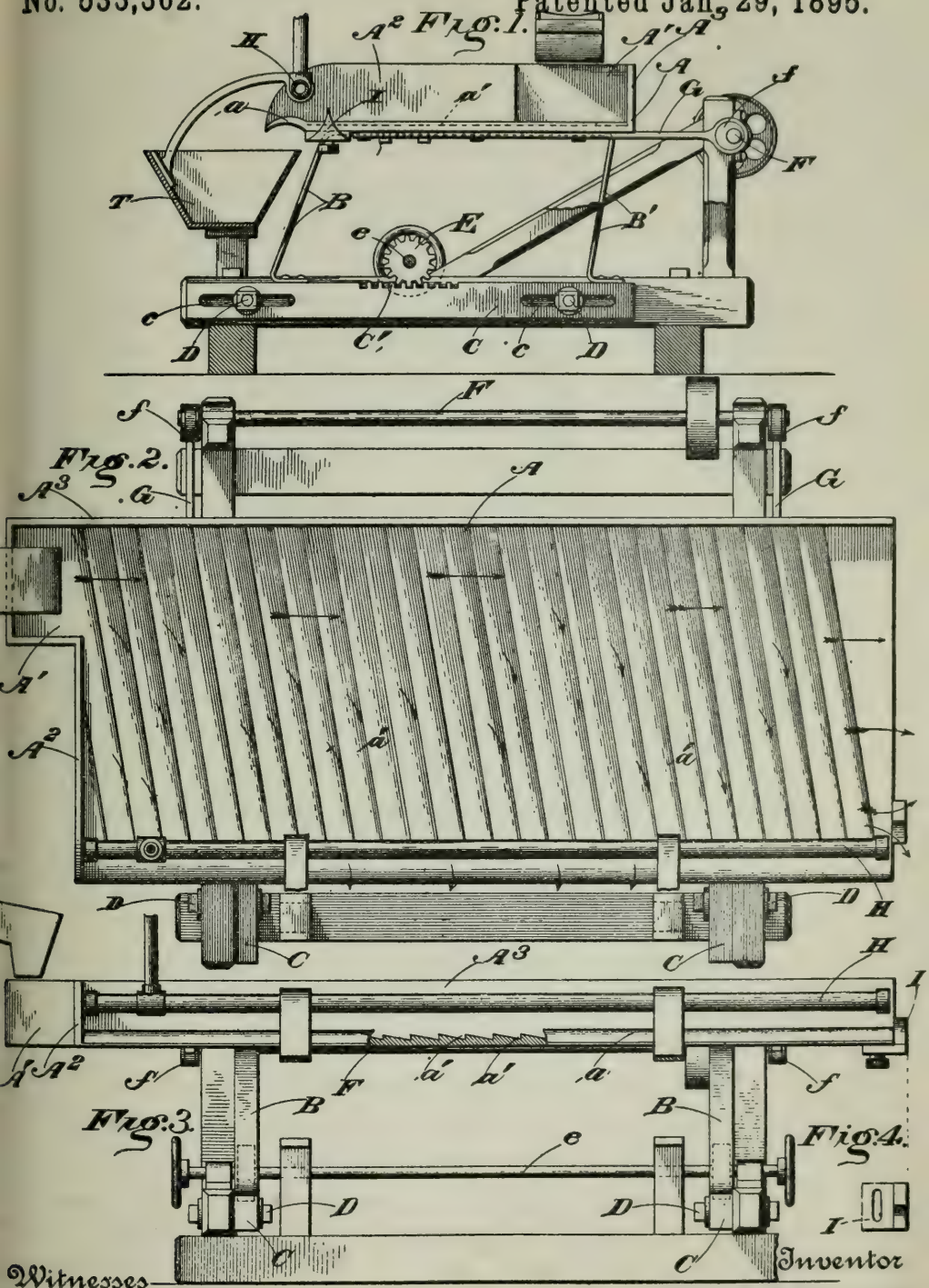
At page 353 of the record is a patent to J. Lampert for an ore concentrator dated June 29, 1895, which is in our opinion a complete answer to the claim of infringement of the Wilfley patent by the Deister table. It contains only one page of drawings of which we insert a reproduction here. It will be convenient to study Fig. 2 first. It will be seen that, while the outside frame is rectangular, the riffled surface is rhomboidal, exactly like the Deister. The pulp box *A'* at the left discharges pulp upon the head of the table as in the Deister. The pulp flows down to the foot leaving its mineral particles in the spaces between the riffles and the gangue going off at the foot as on the Deister. In the meantime a reciprocating movement communicated by the shaft *F* having cams *f f* at its ends connected with the table by straps *G G* pushes the mineral particles along the riffle troughs to the concentrates discharge at the side of the table, just as in the Deister. These movements of the material are shown by arrows on the face of the drawing. The full, feathered arrows indicate the path of the pulp from the pulp box *A'* to the foot of the table, while the short, tailless arrows indicate the course taken by the mineral particles as they turn toward the concentrates discharge under the influence of the reciprocating movement. All this is exactly like the Deister.

The concentrates are washed up just as they are leaving the table by a spray from a perforated pipe *H*

(No Model.)

J. LAMPERT.
CONCENTRATOR.

No. 533,362. Patented Jan. 29, 1895.



Witnesses
M. C. Fowler.
James R. Mansfield

Inventor
Jacob Lampert
by Alexander & Dowell
Attorneys

seen at the concentrates discharge edge of the riffled surface. This spray does the work of the washboard in the Deister table, and is its full equivalent.

In Fig. 1, at the top, is shown the washing-up device in cross section. *T* is the concentrates box. At *a'* are shown the riffles in cross-section. At *a* is a slight elevation in the floor of the table over which the concentrates pass in leaving it. Just above that elevation is the perforated pipe *H* which we saw at *H* in Fig. 2 and which delivers a continual spray on the concentrates as they leave the table. The patentee calls this part a "bead or flange," which is a curious name to apply to it. But the drawing shows what it is, and it can be made as flat and wide as may be desired.

As a whole, the Lampert table is inferior to the Deister. That is to be expected. It was 14 years earlier in the art. But in its general features the resemblance is close. It has the same rhomboidal working surface; the same transverse arrangement of riffles; the same flow of pulp from head to foot; the same discharge of gangue at the foot; the same reciprocating movement; the same delivery of concentrates along the riffle terminals; the same washing-up process as the concentrates leave the table. So far from being an imitation of Wilfley the Deister table harks back to the prior art.

There are some observations near the close of the opinion that we are not sure we understand. In the last paragraph of page 8 this is said:

> "The riffles in the Deister table, used by the appellants, differ from those of the Wilfley

> table in that each alternate riffle terminates with minute and slightly deflected ends which have an elevation of but one thirty-second of an inch, so that at the conclusion of the separation, the material is discharged into the open spaces between them."

And in the first paragraph of the next page:

> "We are of the opinion that the use of these deflected terminals so greatly reduced in elevation does not serve to differentiate the Deister table from that of the patent in suit, whether the space covered by them be regarded as substantially a smooth surface, as was held in *Wilfley* v. *Denver Engineering Works Co. et al,* 111 Fed., 760., and in *Mine & Smelter Supply Co.* v. *Braeckel Concentrator Co.,* 197 Fed. 897, or whether they be regarded as a continuation of the riffles."

Does this mean that the court regards a riffle only one thirty-second of an inch high as not a riffle at all, and a space covered with them as in effect a smooth space; or that the space between the low, deflected riffles serves no function of concentration? The words "so that at the conclusion of the separation, the material is discharged into the open spaces between them" would seem to import that the court was assuming that the separation was complete before the material entered the spaces between the low, deflected riffles. That was the view propoundedby Mr. Hodges, expert for the plaintiff in the District Court. He gave his deposition (which occupied a good many days) in Washington city. It appeared on cross-examination that he had never seen a Deister table at work and had given his opinions upon the basis of his own

inner consciousness. We then adjourned the examination to Morenci, where the tables were at work and investigated the subject on the ground. We found that when a Deister table was in operation sand could be seen with the naked eye passing over the low, deflected riffles all the time. That proved that concentration was going on. We put on six witnesses, each one of whom testified that he had observed the table at work and had seen sand pass over those riffles. They were Gilbert H. Davidson, W. A. Moore, Rudolph Gahl, Geo. Nord, Earl Schuyler and Gustavus E. Hunt. Their testimony is on pages 244-5 and 6 of the record, and is brief, and we ask the court to read it there without quotation here.

One at least of the witnesses speaks of seeing sand *and concentrates* passing over the riffles. That would necessarily be so. It would not be possible to make a clean-cut separation between sand and concentrates in passing over one riffle. In all concentration by passing over riffles the process is progressive. In crossing each riffle trough the material drops some of its mineral particles, while the remainder goes over with the sand. By the repetition of this process frequently enough the mineral is extracted little by little and the sand passed on down as waste. The operation is precisely like that which takes place in the passage of pulp across the higher riffles, only on an extremely small scale. By the time the material reaches the lowest riffles only the finest sand remains. It has to be coaxed over the riffles by a nice adjustment of height—low enough to let the sand go over,

and high enough to hold the concentrates back. It appeared to us, however, that the problem was one which would admit of a more certain solution than that to be obtained by observations with the naked eye. Those low, deflected riffles are about 13 inches long. If concentration goes on in the trough between them the material as it leaves them must be richer in mineral than when it enters them. So we asked Mr. John Kiddie, the most skillful expert in such things we ever met, to devise some way of testing that question, which he did. His testimony is on pages 243 and 4 of the record and his report of the test with a blue print drawing illustrating the method employed and the two metalic scoops he used are on file among the exhibits in the hands of the clerk, as appears on page 256 of the record, being the three first items of the list. We have reproduced the blue print drawing and insert it here, with a copy of Mr. Kiddie's description of the method employed in making the test. This is his testimony.

> "In order to show that concentration was going on along the terminal riffles, the following method was employed. Two small scoops of thin sheet copper were made, wide enough to fit between two of these riffles, with their edges filed sharp. These scoops were longer than they were wide and provided with a suitable handle. Two jets of water were arranged by means of flexible rubber tubing provided with two pointed glass tips.
>
> "Two men, each with a scoop and a water jet, took the samples. The two scoops were placed simultaneously between the same two riffles, one near either end with their sharp

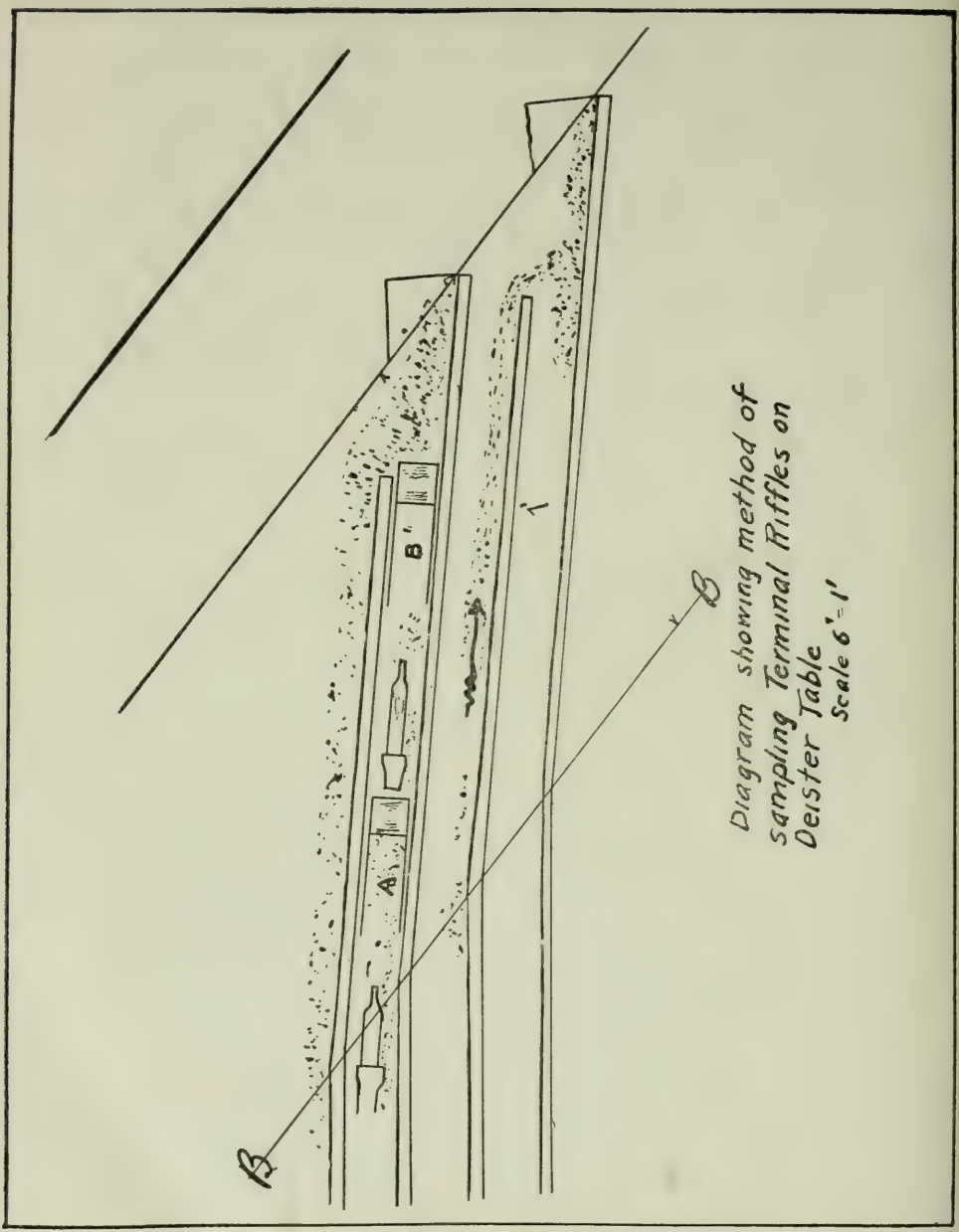


Diagram showing method of sampling Terminal Riffles on Deister Table
Scale 6' = 1'

edges against the surface of the table and their long axes parallel to the riffles. With the water jets the concentrates lying between the two riffles from $\frac{1}{2}''$ to $\frac{3}{4}''$ in front of the scoop, were washed into the scoop and caught. This operation took the fraction of a minute, when the scoops were removed and the table again allowed to resume its normal work.

"Three sets of samples were taken in this way. In the first set, marked (1), 12 samples were taken on the 8th riffle, and 12 samples on the 12th riffle, numbered from the top of the table (nearest the feed box). These two riffles were selected because it could be seen that a moderate amount of sand was continually being washed over them.

"In the second set of samples marked (2) they were taken at every fourth riffle, beginning at the bottom of the table and working up to the top. This was repeated four times.

"(3) represents 20 samples taken more or less at random from riffles where an excessive amount of sand was being washed over.

"Samples taken between the terminal riffles on one Deister table.

	Scoop A		Scoop B	
	% Cu.	% Ins.	% Cu.	% Ins.
(1)	12.44	59.26	20.60	32.68
(2)	18.42	37.26	24.76	16.16
(3)	22.42	21.70	28.22	7.00

"Before taking these samples, the table was set to throw the lines of concentrates approximately on the line following the end of the terminal riffles to the left of scoop A in the sketch.

"The above results show a very material amount of cleaning taking place between the two points at which samples were taken off.

> This is shown by the decrease in the percentage of insolubles in the concentrates with a corresponding increase in the percentage of copper, as they traveled along the terminal riffles toward the discharge point."

The painstaking thoroughness of this report is remarkable. It embraced the following samples:

12 From the 8th riffle on the table.
12 From the 12th riffle on the table.
36 From every 4th riffle from the bottom.
20 At random.
80 In all.

Taking these as a whole, they speak absolute truth as certainly as that commodity is attainable by human effort.

Counsel for the plaintiff never questioned the accuracy of this testimony. It demonstrates with absolute certainty that the work of concentration on the Deister table continues to the very ends of the riffles.

These observations show exactly what goes on in the low, deflected riffles of the Deister table and demonstrates with certainty that the active work of concentration is continued to their terminals. Upon the whole, the views expressed by the court on pages 8 and 9 which we have quoted above, are shown to be erroneous. A riffle is a riffle as long as it performs the work of a riffle though it be only one thirty-second of an inch high, and the open spaces between the low, deflected riffles are riffle troughs in a true sense.

The circumstance of the deflection of those riffles downward has no significance. They could extend straight on from the line *B B* to their terminals without any material change of operation or result. A little loss, it may be, in the last refinment of perfection of operation, but nothing more.

In the District Court the plaintiff relied on two grounds in support of its claim for a broad construction of the Wilfley patent. One was that the Wilfley table had been very extensively used. All the plaintiff's witnesses had a great deal to say about that. The other was that it embodied a novel principle of great value. The first of these will not count here because this court in its decision in *Hyde* v. *Minerals Separation* sat down hard upon this same claim made there. We quote from page 761 of the Mining Scientific Press in which the decision was published.

> "The decision of the court below appears to have been largely influenced by the consideration that the appellee's patent had gone into extensive and successful use. The fact that a patented device or process has gone into extensive and successful use is often of value in determining the question of invention and patentability. It is referred to for the purpose of turning the scales in cases of grave doubt. It is of no value whatever where the question of invention or patentability is free from doubt, and in any case its value depends largely upon the causes which produced it. It is often due to business ability in manufacturing, exploiting, and advertising, and to the fact that prior conditions have not stimulated development."

In this case the question of invention is not in

issue. The validity of the Wilfley patent is admitted and the sole defense is non-infringement. Hence the fact of extensive sales is wholly immaterial.

At the hearing in this case we obtained leave to file a brief in reply, which we did within the 10 days allowed. In that brief two points are urged which we wish to present again here. The first of these is that the patent is limited to a special form of riffle—to the metallic Z-bar riffle, which is not found on the Deister. We are not charged here with imitating the commercial Wilfley table, and if we were, we would not be liable. If we are liable at all it is for infringement of the patent. This is printed on page 299 of the record.

On sheet 1 of the drawings, in Figs. 5 and 7, are shown cross-section outlines of the riffles, (Rec. p. 299). On page 1 of the patent (Rec. p. 301) lines 32 to 40, there is this description of it.

> "Let the numeral 5 designate the table provided with longitudinal riffles 8, attached to its upper surface. These riffles are of unequal length and angular in cross section. The vertical or upwardly projecting part of the riffle is designated by the reference-character 8^a, and the upper part, which lies parallel with the bed of the table, is designated by the reference-character 8^c."

He then goes on to describe the position and varying lengths of the riffles, and then, in column 2, the mechanism for producing the reciprocating movement of the table. In column 1 of page 2, he describes the

washing up process which takes place on the smooth space *A* along the terminals of the progressively lengthening riffles. And then, in column 2 of page 2, he describes in detail the functions and operation of the angular riffles in these words:

> "The function of the angular riffles will now be described in detail.
>
> "The part 8^a of the riffles would be sufficient alone to catch the larger and heavier particles of mineral, but some of the more minute particles would be forced over the riffles and carried downward with the gangue and perhaps finally lost were it not for the part 8^c of the riffles, which checks this tendency and allows specific gravity to prevail, the same as in hand panning. It is well known that the finest particles of mineral can be saved by hand-panning. The specific gravity of the finest particle of gold is, of course, the same as the largest nugget, and if the proper conditions exist the minute particle can be saved as well as the nugget. The object of my angular riffles is to produce the conditions necessary to save not only the largest but also the finest mineral particles. Under ordinary conditions these fine particles when acted on by a current of water are carried along with the water, and consequently lost with the ganque. The upper part 8^c of my riffle checks the tendency of these light particles to pass over the riffles with the water. Hence they are confined by the bed of the table below the part 8^c of the riffles above, while the part 8^a of the riffles checks their downward movement. Hence under the influence of the table's movement or vibration the mineral particles, both fine and coarse, are caught by the riffles."

Right in the midst of this minute and specific description of his invention, in the last four lines of column 2, page 2, he makes this surprising statement:

> "While I prefer to employ the angular riffle shown and described in this application, I do not limit the invention to any special construction of riffle."

This must be regarded as a nullity. The Statute, Sec. 4888, R. S., requires the applicant to describe his invention in "full, clear, concise and exact terms," and in the case of a machine, as this is, to "explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions." This applicant did all that. He described his invention, including the angular riffles, in very full, clear, concise and exact terms, and explained the principle of their operation very minutely. Then he says he does not limit himself to any special construction of riffle. He might as well have made the same statement about any other part of his invention. He might as well, after describing his progressively lengthening riffles, have added that he did not limit himself to any length or arrangement of riffles. Such fast and loose use of words is not a compliance with the statute. It is either nugatory and void, or it invalidates the patent entirely for non-compliance with the law. We think it is fairer to take the former horn of the dilemma; to regard the patent as valid for the construction described and claimed in it, and the inconsistent reservation as a nullity. It follows necessarily that the Deister table does not infringe.

It is not uncommon in the exploitation of patented inventions to introduce new features of construction in the apparatus suggested by practical experience. They usually improve it for use. The tapering riffles were such a feature and were an improvement in the table for use, no doubt. But a suit for infringement must rest on the patent, and nothing infringes that does not embody the construction described and claimed in it.

The other point is that in an infringement case the burden of proof is on the plaintiff and that the charge of infringement is one to be established by the clear preponderance of evidence required in other cases of tort. It is the duty of all persons to respect the rights of patentees. An act of infringement is a legal wrong —a tort. A charge of such an act must be proved by a clear preponderance of evidence. If that is not found in the proofs, the finding must be for the defendant. There are many cases to this point. For instance, in *Fried. Krupp Aktien-Gesellshaft* v. *Midvale Steel Co.,* 191 Fed., 588 (C. C. A., 3d Cir.), which was a suit on a series of armor plate patents, Judge Buffington said on page 591 of the report:

> "Infringement is not only a question of fact, but is a tort or wrong, the burden of establishing which, as in all torts, clearly rests on those who charge such wrong. The absence of actual fact proof is not met by the presence of expert speculations no matter how voluminous."

In *Bene* v. *Jaentet,* 129 U. S., 683, the suit was on a patent for refining and bleaching hair. All the testi-

mony before the court on the point in dispute was that of two experts, one of whom testified to facts within his knowledge, and the other to theories on the subject. There is substantially the same difference here. The evidence for the defendant rests on ascertained and demonstrated facts, measurements and tests; that for the plaintiff on theory and asseveration. The court by LAMAR, J., said, on page 688:

> "We think the complainants did not make out a case of infringement. There is not a preponderance of evidence in their favor."

See, also, Walker on Patents, sec. 522 and cases cited.

3 Robinson on Patents, sec. 1041, where an immense number of cases are gathered together.

The same principle applies to this petition for rehearing. If, upon the whole case which we submit the court is in doubt whether our petition ought to be granted or not we claim the benefit of the doubt.

We wish to add a few last words upon what we regard as the most important part of this brief. It is the applicability to the case of the decision of the Supreme Court in *Westinghouse* v. *Boyden Power Power Brake Co.*, 170 U. S., 537. We are bound to assume, of course, that this court will defer to authority. The Westinghouse case has never been overruled. On the contrary, it has been followed by Courts of Appeals and District Courts many times. It stands as

one of the great landmarks of the patent law. The only question we need discuss is its applicability to the facts in this case.

That depends upon whether or not the Deister table contains in its structure and operation the elements of a new invention as compared with the Wilfley. It is a curious circumstance that our proofs in the record on that subject are without a word of contradiction. Take, for example, the matter of comparative areas of concentrating surface—78 square feet on the Wilfley, 36.6 on the Deister. If those figures are not correct it would be perfectly easy to disprove them. As no attempt was made to do that they must stand as absolute truth. Then one would naturally suppose that the smaller table would do less work than the other. We proved the contrary. The Superintendent of the great mills at Morcenci, using both tables, testified that he made no distinction between them in that respect, but gave them the same load. If that were not true it could have been disproved. It was not, and so must be taken as truth.

There must be a reason. There are many of them. They are found in the elements of new invention embodied in the Deister. There are the high riffles with the pools formed above them. There are the step-downs by which the riffles are reduced in height from point to point to accomodate them to the conditions of the material in the successive stages of its concentration. There is the arrangement of riffles by which the particles of mineral dropped in a riffle trough stay in that trough to its end, and, at the end of it,

at the moment of final washing-up are combined with those of an adjacent trough and the output of the two troughs pass into the concentrates box. One of the important features of the table is its working position, by reason of which the concentrates have to travel uphill under the impulses of the reciprocating movement from the time they start. There is no controversy about these features of the table. They are all earmarks of invention—of the wise adaptation of means to ends. That it was a successful invention the result shows—16 per cent more copper from the same pulp.

We cannot help feeling confident that the court will give us a re-hearing on this point if on no other.

Respectfully submitted,

R. S. TAYLOR,
E. M. HULSE,
For Petitioners.

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United States
Circuit Court of Appeals
For the Ninth Circuit.

THE DETROIT COPPER MINING COMPANY OF ARIZONA, a Corporation, AND THE ARIZONA COPPER COMPANY, a Corporation, *Defendants-Appellants,* vs. THE MINE AND SMELTER SUPPLY COMPANY, a Corporation, *Complainant-Appellee.*	No. 2291.

Appeal from the District Court of the United States for the District of Arizona.

REPLY TO APPELLANTS' PETITION AND BRIEF FOR REHEARING.

The appellee in the above entitled causes respectfully submits that a rehearing thereof should not be granted upon the Petition for Rehearing filed therein by the appellants, and in support of appellee's opposition there-

to we respectfully venture the statement that neither the petition presented, nor the argument and citations from the records and the law accompanying the same and in support thereof, present any new or forcible ground indicating such a palpable mistake or overlooking of material facts in the record on the part of the Court as should warrant or move the Court to grant a rehearing as requested.

The statement of the case and decision of the Court as embodied in its opinion filed herein, necessarily indicates that the records and briefs in the case have been carefully studied and comprehended, and out of the maze of statements, arguments and citations contained in the briefs filed by counsel for appellants, tending to lead the Court far afield and cover up and obscure the very essence of the controversy, this Court has discerned the indisputable and controlling facts of the case, and arrived at the exact and only just conclusion that "the appellants have availed themselves of the distinctive feature of the Wilfley table, and therewith they have performed the same function by the same means, and in substantially the same manner as in the Wilfley combination" (Conclusion of the Court's Opinion).

We cannot find a pertinent proposition in the appellants' Petition for Rehearing, the substance of which in the same or possibly slightly varied form of argument, has not already been advanced and discussed and dwelt upon at great length in the briefs filed by counsel for appellants before and after the case was submitted and prior to determination, and in view of the presentation of the case of the appellee in its brief first filed herein,

wherein it was sought to state clearly and concisely the position of the appellee, and the proofs, authorities and precedents in support thereof, in our judgment a mere reiteration or elaboration thereof as a response to the appellants' Petition and Brief for Rehearing would be an imposition upon the time and patience of this Court, and would not serve to further enlighten the Court.

In two particulars only do we care to add anything further by way of reply to the Petition and Brief for Rehearing than we have already contended for and answered in our brief first filed (to which we respectfully refer the Court for such further perusal as it may desire), and that is in connection with the great and repeated emphasis with which counsel again and again state their claims for recognition by this Court of the cases of Railway vs. Sayles, 97 U. S., 554, and Westinghouse vs. Boyden Power Brake Co., 170 U. S., 537, and the line of authorities following each respectively, as enunciating doctrines and principles of law controlling in and decisive of these cases at bar.

As again answering the contentions based upon the case of Railway vs. Sayles, and cases following, we refer to our original brief, pages 96-98. We make no controversy over the doctrines of that and similar cases as applied to the facts involved, which we do again say widely differ from those of the cases at bar.

Regarding the case of Westinghouse vs. Boyden etc., which counsel for appellants insist is and must be controlling herein, unless its applicability to the facts of these cases at bar can be differentiated, we will say, that the quotations given by counsel from the case, and

from those cases cited as following the doctrine thereof as there laid down, seem to clearly point out those cases in which the doctrine is applicable, and distinguish those in which it is not, so that we can easily determine that the doctrine is clearly inapplicable to the facts of these cases at bar. We need only to quote in "caps," and by so doing further emphasize the italics of the quotation first appearing on page 31 of appellants' Petition and Brief for Rehearing, and then apply the test to the Deister tables here involved—Has Deister "SO FAR CHANGED THE PRINCIPLE" of the Wilfley invention and table that he can escape the charge of infringement under the law of the Westinghouse case?

The testimony is abundant and conclusive that Deister *has not "So far changed the principle"* of the Wilfley invention as to escape infringement, but on the contrary, that he retains and appropriates the means substantially, and operates his table upon the same principles and performs the same functions in substantially the same way as the Wilfley table. The cases following the Westinghouse case all emphasize this "change of principle" test in the device of the later invention from the earlier invention by which under the facts of each particular case infringement may be avoided.

We believe counsel discredit their own citation of the Westinghouse case in dwelling with so much emphasis and particularity upon the so-called improvements and inventions making the Deister table superior to the Wilfley table, as for example, that the Wilfley table deck contains 78 square feet to the 36.6 square feet for the Deister. Conceding, for sake of argument, that this and

other features referred to may be improvements over the Wilfley, and an increased efficiency in various ways result from the adding to or taking from the *form* of Wilfley construction, it is all quite immaterial, for the indisputable fact remains that the Deister has appropriated all of value in the Wilfley invention, and with all of the claimed improvements *has made no change in principle*, and this Court is fully sustained by the facts in so finding.

We again submit that there are no good reasons presented to entitle appellants to a rehearing of these cases.

Respectfully submitted,

GEORGE L. HODGES,
D. EDGAR WILSON,
Solicitors for Appellee.

IN THE

UNITED STATES CIRCUIT COURT OF APPEALS

FOR THE NINTH CIRCUIT

Detroit Copper Mining Company of Arizona, a Corporation,

Appellant,

vs.

The Mine and Smelter Supply Company, a Corporation,

Appellee,

and

Arizona Copper Company, a Corporation,

Appellant,

vs.

The Mine and Smelter Supply Company, a Corporation,

Appellee.

No. 2291

REJOINDER TO APPELLEE'S REPLY TO APPELANTS' PETITION FOR RE-HEARING

We have received from counsel for the appellee a printed reply to our petition for re-hearing in this case. This is the first time in a rather long experience in such matters that we have known a reply to be filed to a petition for re-hearing. But we make no objection to it provided the court will entertain our rejoinder to it, which we think it ought in justice to do.

We are at such a distance from the court that this paper may not arrive within the time allowed us for our petition for re-hearing, although it was extended ten days by the courtesy of the court. If it should not, we shall beg the court to read it nevertheless.

Counsel say on page 3 that "In two particulars only do we care to add anything further by way of reference to the Petition and Brief for Re-hearing than we have already contended for and answered in our first brief filed, and that is in connection with the great and repeated emphasis with which counsel again and again state their claims for recognition by this court of the cases of *Railway* v. *Sayles,* 97 U. S., 554, and *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S., 537, and the line of authorities following each respectively."

Counsel then refer to pages 96-98 of their former brief for their argument on *Railway* v. *Sayles.* Turning to those pages of the brief we find a criticism of *Railway* v. *Sayles.* On page 97 counsel say "A careful reading of the Sayles case renders it apparent that the court was dealing with inventions which had to do with forms, the improvements made consisted of better forms for doing the same thing. They involve no new functions, the application of no new principles." And on page 98 they say this: "It is not true that the invention of the Wilfley patent inheres in an improved or better *form* for doing the same thing. It consists of securing better results by applying new principles and new functions." What short memories counsel have. Let us refer them again to the words of their

own complaint. They are on the last 7 lines of page 27 and the first 6 lines of page 28 of the printed record in these words:

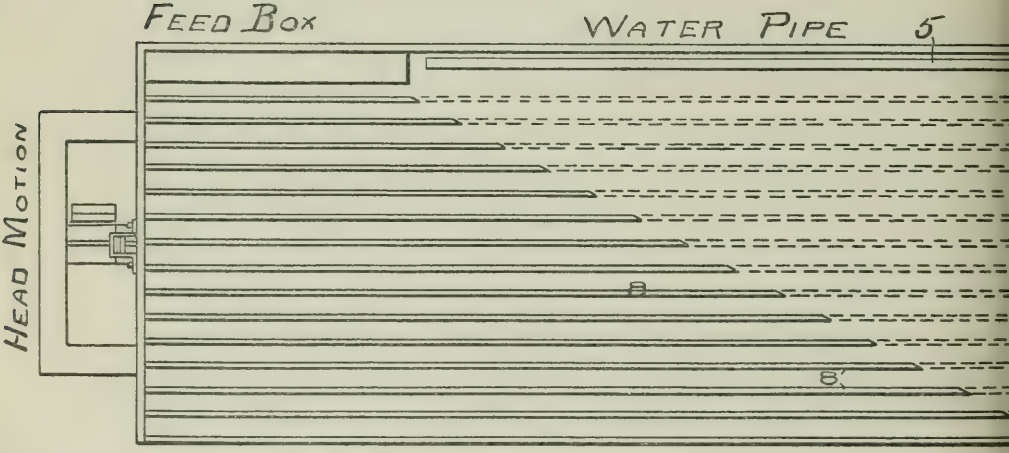
> "And thereafter the same (the Deister tables) were used, and continuously ever since and still are being used in the concentration of ores by said defendant at the place aforesaid, with certain riffles upon the tops or concentrating surfaces thereof, which in their construction, adjustment and arrangement upon said table surfaces substantially embody and contain the improvements and invention so patented to the said Arthur R. Wilfley as aforesaid by said hereinbefore described letters (30) patent No. 590,675, now owned by your orator as aforesaid, and especially the improvements covered and protected by the first, second, and seventh claims of said letters patent."

What is this but a matter of form—"the construction, adjustment and arrangement of riffles" on a concentrating table deck.

Furthermore we did not cite *Railway* v. *Sayles* alone, but *McCormick* v. *Talcott* and fifteen other cases following them and applying the same rule of narrow construction to as many different patents, including such inventions as washboards; coffee mills; overalls; coal scuttles; soldering irons; friction clutches; dating stamps, and harness hooks—all inventions resting in form. Every one of these decisions is entitled by itself to recognition as authority in this court. Were we not justified in feeling somewhat aggrieved that the court took no notice of them whatever? In their reply to our petition counsel merely refer to what they said in their original brief on these

cases, and in that they did not come within a thousand miles of meeting them.

We beg the court to notice how restricted this issue is. There are things about these tables which do not consist in mere form. There is machinery located under each of the tables by which the reciprocating movement is imparted to it which is not matter of form in any sense except that in which all machinery is matter of form. But the mere construction, adjustment and arrangement of riffles on the surface of a concentrating table deck is as pure matter of form or configuration as can be imagined. We would like to illustrate that idea by a little drawing. Here is the



Wilfley table deck with no change except to extend its riffles as indicated by the dotted lines straight on to the foot instead of cutting them off along a diagonal line as shown in Fig. 3 of the patent. This little change of form or configuration of the table surface has made a new table out of it. Counsel have much to say about

the "principle" embodied in the Wilfley table. What is it? The washing-up function performed along the diagonal line of riffle tips and on the smooth space adjoining them. That function is not present in this modified form of the Wilfley table. That is to say, the principle disappeared with a slight change of configuration of surface. The meaning of all this is that all inventions consisting of new arrangements of riffles on concentrating tables are inventions resting in *form,* and so fall directly within the cases cited in our original brief following *Railway* v. *Sayles* and *McCormick* v. *Talcott.*

But the questions to which we wish to draw particular attention now are those which arise upon the case of *Westinghouse* v. *Boyden Power Brake Co.* Counsel in referring to that case on page 4 of their reply to our petition make a very inadequate statement of it. Our statement of the proposition for which we relied upon it on page 31 of our petition for re-hearing was (italics and all) "but if the latter (the defendant) has *so far changed the principle of the device* that the claims of the patent literally construed have ceased to represent his *actual invention,*" and so forth. But the italics are not in the court's statement of the rule as embodied in the report. The unemphasized language of the court is this:

> "The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principle of the device that the claims of the patent, literally construed, have ceased to represent his actual

> invention, he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent." 170 U. S., 568.

The binding authority of this decision cannot be impugned. The only question is whether the claims of the Wilfley patent, literally construed, represent the actual invention present in the Deister table, or does it embody a new invention over and beyond the invention embodied in the Wilfley patent? The facts necessary to be understood here cannot be presented in a few words. The court must completely understand the Deister table or it cannot form any just judgment of the bearing of the Westinghouse case on the issue here. It is impossible for us to describe it here in the time and space open to us, and so we beg the court to read again pages 16 to 24 inclusive, of our original brief. With that description of the Deister table in mind the court will be in situation to appreciate what we have to say about the Westinghouse case.

The Wilfley patent was granted Sept. 28, 1897. This suit was begun Feb. 24, 1910. The Wilfley patent was then over 12 years old. The Deister table had just come out. It had not then been patented. Was it not to be expected that there would be some advance in the art in that interval? Let us point out some features in which the Deister table exhibited an unquestionable advance. The first of these is its few high riffles dividing the others into groups. The function which they perform of creating pools above them which flood the riffles between them each about

half way to the next high riffle above is a unique and valuable feature of the table. There is nothing like it on the Wilfley table. It greatly accelerates the process of concentration. Does it not represent invention? Suppose it be conceded that the claims of the old Wilfley patent literally construed would cover it. Is it not a case in which the defendant "has so far changed the principle of the device that the claims of the patent literally construed have ceased to represent his actual invention?" The change in principle is the introduction of the principle of cutting up the surface of the table into pools covering about half the surface and so doing about half the work of concentration by submerged riffles. That construction is his "actual invention."

Then there is the washboard, by which a thin film of water is kept constantly flowing down to meet the concentrates at the last minute before they leave the table and give them their final washing-up, and which is all the water used on the table. That is another feature of "actual invention."

Then there is the position of the table in operation. It has first, a general declivity from head to foot. That takes the mass of the pulp directly across the riffles to the tailings discharge by the longest dimension of the table. At the same time the table slopes upward across its shorter dimension to the concentrates discharge. The result is that the concentrates are traveling uphill from start to finish. All the metallic particles that gravitate to the bottom of each riffle trough stay there and follow it to its termination.

The reciprocating movement is thus pulling the concentrates away from the sand all the time. The result is a rapid and complete separation of the two.

It ought to follow from these combined features that the Deister will do more concentration to the square foot of surface and do it more perfectly than the Wilfley. And it does. We referred the court in our original brief and our petition for re-hearing to the pages in the record where Mr. Hunt testified that the concentrating surface of the Deister table was only 36.6 square feet while the Wilfley was 78 and yet he gave them the same load. We also referred to a critical comparative test of the two tables in which the Deister came out far ahead. The significance of these comparisons is that they confirm the fact that the young little Deister represents an advance in the art over the big old Wilfley. Counsel do not deny these facts. They can not. The proof is in the record. What do these facts mean? In this last utterance of theirs—their reply to our petition for re-hearing, the only answer they have to make to them is this silly remark "We believe counsel discredit their own citation of the Westinghouse case in dwelling with so much emphasis and particularity upon the so-called improvements and inventions making the Deister table superior to the Wilfley table, as for example, that the Wilfley table deck contains 78 square feet to the 36.6 square feet for the Deister."

But we have here the remarkable phenomenon of the little surface doing as much work as the larger one and doing it better—getting over twenty-five per cent

more mineral out of the same pulp. THERE'S A REASON. WHAT IS IT? Counsel don't pretend to give any. We have given it. It is the features of *new invention* present in the Deister table which we have described—the combination of high and low riffles, the new form of water supply, the new way of washing-up, the position of the table at work. These are elements of "actual invention" which the claims of the Wilfley patent "have ceased to represent." They exhibit the very situation defined in the Westinghouse case—a young invention caught by the literal words of the claims of an old patent, where, as the court says "he is as little subject to be adjudged an infringer as one who has violated the letter of a statute is to be convicted, when he has done nothing in conflict with its spirit and intent."

The court can not deny us a re-hearing without disregarding the Westinghouse case.

To all this and all other arguments counsel have just one final answer, which is the "principle" said to be embodied in the Wilfley table—*the principle,* THE PRINCIPLE, THE PRINCIPLE. They have kept repeating these words for four years with the never ending iteration of a parrot's "Polly wants a cracker." What is that principle? It is the washing-up process of the Wilfley table along its diagonal line of advancing riffle tips adjacent to a triangular smooth space. Counsel have pointed out no other. There is no other. That may be called a principle within the meaning of the patent statute, and is a fairly good way of per-

forming that function, but it is not the only way, nor the best way, as we have proved by evidence which counsel have not tried to answer. We hope the court will give no further heed to that fetish.

The weakness of counsel's reply to our petition is as consipcuous in its omissions as in the blunders we have pointed out. They say not a word about the Lampert patent. That patent was granted Jan. 29, 1895. It was over two years and one-half old when the Wilfley patent was issued. On pages 36 and 37 of our petition for re-hearing we pointed out the exact similarity in construction and operation between the Lampert and Deister tables. Counsel offered no answer. We hope the court will take more notice of it.

If we are liable for infringement in this case it must be for infringement of the *Wilfley patent,* not for imitation of the Wilfley commercial table. On pages 46 to 49 of our petition for re-hearing we show that the Wilfley patent is limited in terms to metallic Z-bar riffles. Counsel have offered no answer to that argument. We hope that the court will treat it more courteously.

If the court has read our petition for re-hearing, and the appellee's reply to it and this rejoinder we cannot but feel that there must be some doubt in its mind as to the correctness of its decision in this case. We crave the benefit of that doubt.

Respectfully submitted,
R. S. TAYLOR,
E. M. HULSE,
For Petitioners.